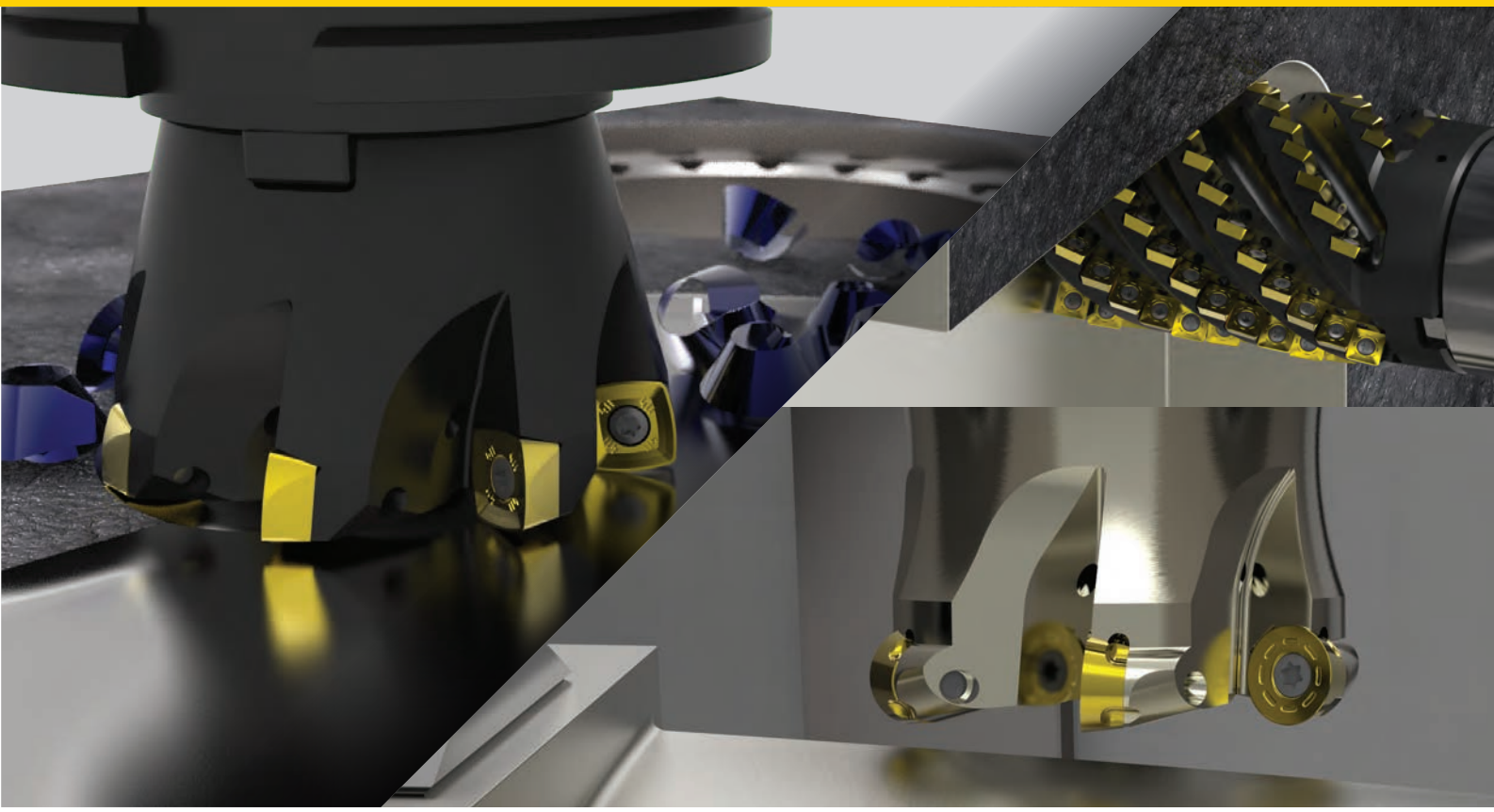
STELLRAM®

CUTTING TOOLS

Stellram® Cutting Tools



HIGH PERFORMANCE MILLING SOLUTIONS

KENNAMETAL®

STELLRAM®

Patented Breakthroughs for Difficult to Machine Materials:

Cut Faster. Cut Longer. Cut More Profitably.

These Kennametal Milling Systems are specifically designed and manufactured for machining high performance, difficult-to-machine materials.

This capability was developed after years of advanced R&D in materials science and machining Titanium and Titanium Alloys, Nickel Alloys and Superalloys, Stainless Steel and Specialty Alloys, and Hard Materials.

The result: These proven “Best in Class” machining solutions presented in this brochure.

Our strategy is to bring “game changing” cutting tool solutions that deliver industry leading metal removal rates. Higher metal removal rates mean you increase capacity, make more profit and deliver in shorter lead times.

Stellram® high performance cutting tools are known for cutting titanium like butter and have found wide application in the aerospace, defense, power generation, oil and gas, medical, transportation and construction and mining industries.

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Page

Application Guide


Chamfer


Contour


Copy / 3D


Face


Full Ø Plunge


Helical Interpolation


Helical Interpolation with Bore Hole


Plunge


Pocket


Ramp


Shoulder/ Profile


Shoulder/ Profile/Slot


Slot/ Shoulder


Spiral/ Circular


T-Slot


Trochoidal

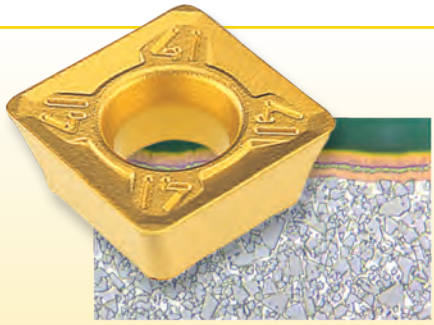
Patented X-Grade Insert Technology

3-TIMES THE METAL REMOVAL RATE

Titanium and Nickel Based Alloys are some of the toughest machining jobs on earth.

And it is a rare element, a member of the platinum family, called Ruthenium, that is one of the key ingredients used in our patented X-Grade™ Technology cutting tools.

We combine Ruthenium with Cobalt to form an exclusive binder that cements our engineered carbide formulas in the making of these inserts.



X-Grade Inserts provide unmatched performance in cutting difficult to machine materials.

7792 High Feed Milling

- Patented Cutter Designs
- Patented Insert Designs
- Patented Grades

To remove the highest volume of metal in the shortest possible time

STELLRAM

7792: Increase Metal Removal Rate up to 90% or More!

Modular
16mm – 32mm

- Cutting diameters from 16mm to 160mm
- Modular, Weldon, Cylindrical and Shell Mill cutter configurations
- Modular Tungsten Extensions maintain stability in deep pocket applications
- All inserts feature 4 cutting edges

Weldon
25mm – 32mm

Cylindrical
16mm – 32mm

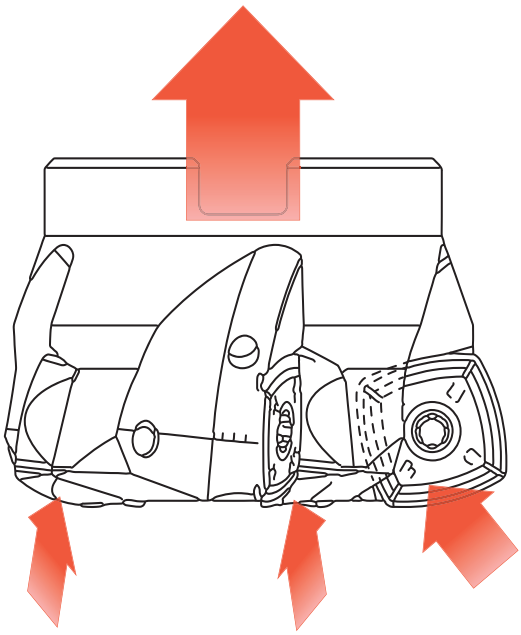
Shell
40mm – 160mm

The Patented 7792 Insert

The unique 7792 insert design provides outstanding operational security and performance, with enhanced metal removal capability.

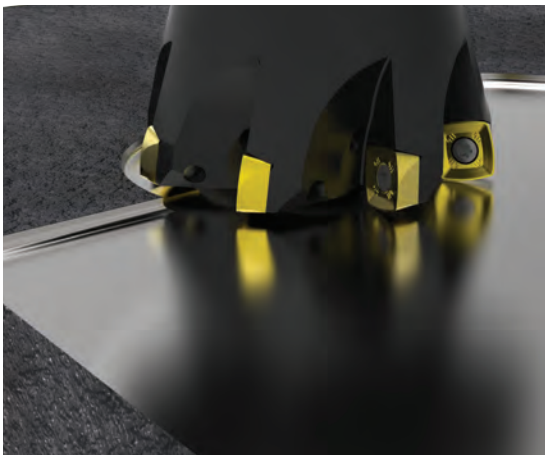
- Maximize tool life, versatility and performance
- Face, Pocket, Shoulder, Profile, Helical Interpolate, Ramp, Copy and Mill Turn with one tool
- 6 grades for materials from Aluminium to Superalloys
- 4 insert sizes available
- Depth of cut from 0,90mm to 3,50mm
- Coarse, medium and fine pitch cutters available for all machining conditions.

How High Feed Cutters Work



The patented design of High Feed Cutters and Inserts combine to drive the cutting forces axially into the spindle. This allows even less rigid machines to outperform newer machines with conventional cutters by taking high feed, shallow cuts.

- 5 times the feed rate of conventional face mills
- High feed, shallow cuts
- Dramatically reduced cycle times
- Reduced vibration
- Better quality parts in less than half the time
- Twice the tool life or more



Hard Case: The Ti Alpha Barrier

The Alpha Casing, which forms during the cooling of the Titanium billet and varies in thickness and hardness, creates nearly impossible machining conditions. The previous most cost effective solution was to chemically remove it with acid.

An aerospace customer was using our X-Grade inserts with our top performing button cutter on several titanium applications. This was our benchmark to test the 7792.

Here's how the 7792VXD12 with X-500 Grade inserts performed on a Ti 6-4 Alpha Case …

- 24% less energy consumed
- 120% increase in material removal rate
- Nearly 3 times the tool life

The 7792 eliminated the need for highly toxic, dangerous chemicals and made effective Alpha Case machining a production reality.

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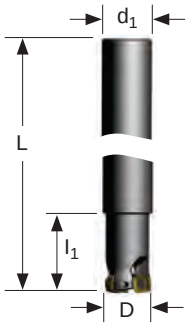
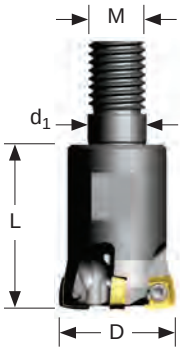


Cylindrical Shank

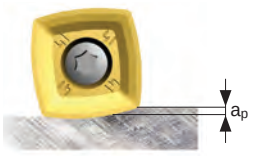
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7792VXP06 Cylindrical Shank												
031644	7792VXP06CA016Z2R140	16	188	25	16	0,90	2	*031449*	FP2506T	*031452*	TP7	1,00
031629	7792VXP06CA020Z3R154	20	204	32	20	0,90	3	*031449*	FP2506T	*031452*	TP7	1,00
031630	7792VXP06CA025Z4R154	25	210	40	25	0,90	4	*031450*	FP2507T	*031452*	TP7	1,00
031631	7792VXP06CA032Z5R190	32	250	40	32	0,90	5	*031450*	FP2507T	*031452*	TP7	1,00



Modular Head

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7792VXP06 Modular Head - Medium and Fine Pitch												
031632	7792VXP06SA016Z2R25	16	25	M8	8,50	0,90	2	*031449*	FP2506T	*031452*	TP7	1,00
031633	7792VXP06SA020Z2R35	20	35	M10	10,50	0,90	2	*031449*	FP2506T	*031452*	TP7	1,00
031634	7792VXP06SA020Z3R35	20	35	M10	10,50	0,90	3	*031449*	FP2506T	*031452*	TP7	1,00
031636	7792VXP06SA025Z3R35	25	35	M12	12,50	0,90	3	*031450*	FP2507T	*031452*	TP7	1,00
031637	7792VXP06SA025Z4R35	25	35	M12	12,50	0,90	4	*031450*	FP2507T	*031452*	TP7	1,00
031638	7792VXP06SA032Z5R43	32	43	M16	17,00	0,90	5	*031450*	FP2507T	*031452*	TP7	1,00

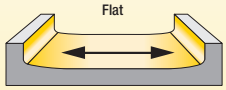
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 45.



Depth of Cut (ap)

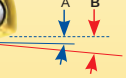
7792VXP06 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle A °	Ramping Angle B °	Helical Hole min. - max.		a_p max Helical / Linear	a_e max Plunging	Max RPM
031644	7792VXP06CA016Z2R140	7,60	5.94	8.03	22	30	0,60	3,00	65000
031629	7792VXP06CA020Z3R154	11,60	3.42	6.12	30	38	0,60	3,00	57000
031630	7792VXP06CA025Z4R154	16,60	2.23	4.24	40	48	0,60	3,00	49000
031631	7792VXP06CA032Z5R190	23,60	1.39	2.60	54	62	0,60	3,00	41500
031632	7792VXP06SA016Z2R25	7,60	5.94	8.03	22	30	0,60	3,00	65000
031633	7792VXP06SA020Z2R35	11,60	3.42	6.12	30	38	0,60	3,00	57000
031634	7792VXP06SA020Z3R35	11,60	3.42	6.12	30	38	0,60	3,00	57000
031636	7792VXP06SA025Z3R35	16,60	2.84	4.24	40	48	0,60	3,00	49000
031637	7792VXP06SA025Z4R35	16,60	2.23	4.24	40	48	0,60	3,00	49000
031638	7792VXP06SA032Z5R43	23,60	1.39	2.60	54	62	0,60	3,00	41500



Ramp angle A uses one outside cutting edge only.

Ramp angle B uses two cutting edges (one outside and one inside edge).



A = max ramp angle utilising full face contact

B = max ramp angle utilising full contact + internal corner radius

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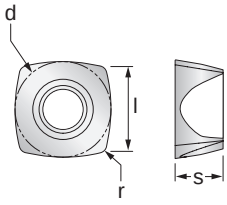
XPLT06-D41



Product			Application & Material			Dimensions (mm)				
			Facing	Slotting	Plunging					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max. 0,90	a_p max. 0,90	a_e max. 3,00					
030403	XPLT060308ER-D41	X400	♦♦♦	♦♦♦	♦♦♦	7,00	7,00	3,18	0,80	0,04
030402	XPLT060308ER-D41	X500	■♦♦	■♦♦	■♦♦	7,00	7,00	3,18	0,80	0,04
031538	XPLT060308ER-D41	SP6519	●●♦□■♦■	●●♦□■♦■	●●♦□■♦■	7,00	7,00	3,18	0,80	0,04
033066	XPLT060308ER-D41	SC6525	■■♦	■■♦	■■♦	7,00	7,00	3,18	0,80	0,04

Machining Choice: ♦ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 19.

7792VXP06 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
ER-D41	X400	Facing	0,20 - 1,10	0,20 - 0,90	-	-	-	-	-	-	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60
ER-D41	X400	Slotting	0,20 - 0,90	0,20 - 0,80	-	-	-	-	-	-	-	-	-	-	-	0,20 - 0,50	0,20 - 0,50
ER-D41	X400	Plunging	0,04 - 0,30	0,04 - 0,20	-	-	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08
ER-D41	X500	Facing	-	-	0,15 - 1,00	0,15 - 0,90	-	-	-	-	-	0,15 - 0,50	0,15 - 0,50	0,15 - 0,50	0,15 - 0,60	-	-
ER-D41	X500	Slotting	-	-	0,15 - 0,80	0,15 - 0,75	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,45	-	-
ER-D41	X500	Plunging	-	-	0,04 - 0,20	0,04 - 0,15	-	-	-	-	-	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	-	-
ER-D41	SP6519	Facing	0,20 - 1,00	0,20 - 0,80	0,15 - 0,90	0,15 - 0,80	0,20 - 1,20	0,20 - 1,00	0,20 - 0,90	0,20 - 0,70	-	0,15 - 0,50	0,15 - 0,50	0,15 - 0,50	0,15 - 0,60	-	-
ER-D41	SP6519	Slotting	0,20 - 0,80	0,20 - 0,75	0,15 - 0,80	0,15 - 0,70	0,20 - 1,00	0,20 - 0,90	0,20 - 0,80	0,20 - 0,70	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,45	-	-
ER-D41	SP6519	Plunging	0,04 - 0,25	0,04 - 0,18	0,04 - 0,20	0,04 - 0,14	0,04 - 0,25	0,04 - 0,20	0,04 - 0,18	0,04 - 0,25	-	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	0,04 - 0,06	-	-
ER-D41	SC6525	Facing	0,20 - 0,95	0,20 - 0,78	-	-	0,20 - 1,20	0,20 - 1,00	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,20 - 0,78	0,20 - 0,72	-	-	0,20 - 1,00	0,20 - 0,90	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,04 - 0,23	0,04 - 0,17	-	-	0,04 - 0,25	0,04 - 0,20	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page 14.

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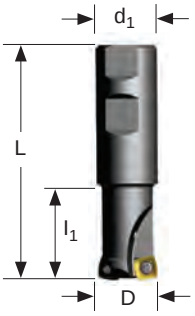
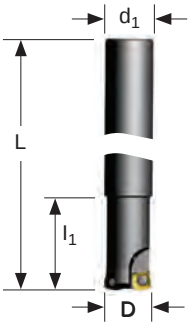
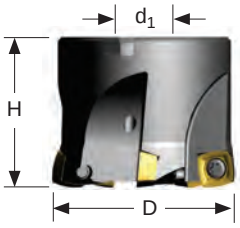


Weldon Shank

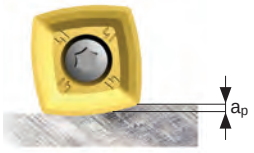


Cylindrical Shank



Shell Mill Fixation

Modular Head



Depth of Cut (ap)

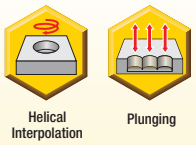
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXD09 Weldon Shank												
029461	7792VXD09WA025Z2R	25	96	40	25	1,50	2	*015269*	F3508T	*015240*	T15	2,10
029462	7792VXD09WA032Z3R	32	100	40	32	1,50	3	*015064*	F3510T	*015240*	T15	2,10
7792VXD09 Cylindrical Shank												
031191	7792VXD09CA025Z2R50	25	200	50	25	1,50	2	*015064*	F3510T	*015240*	T15	2,10
031192	7792VXD09CA032Z3R70	32	250	70	32	1,50	3	*015064*	F3510T	*015240*	T15	2,10
7792VXD09 Shell Mill Fixation - Coarse, Medium and Fine Pitch												
029463	7792VXD09-A040Z3R	40	32	-	16	1,50	3	*015064*	F3510T	*015240*	T15	2,10
029464	7792VXD09-A040Z4R	40	32	-	16	1,50	4	*015064*	F3510T	*015240*	T15	2,10
030434	7792VXD09-A040Z5R	40	32	-	16	1,50	5	*015064*	F3510T	*015240*	T15	2,10
030435	7792VXD09-A050Z5R	50	40	-	22	1,50	5	*015064*	F3510T	*015240*	T15	2,10
030436	7792VXD09-A050Z6R	50	40	-	22	1,50	6	*015064*	F3510T	*015240*	T15	2,10

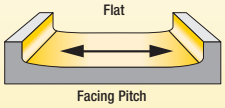
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d_1	a_p max	No. of Teeth	EDP		EDP		Screw Tightening Nm
7792VXD09 Modular Head												
030613	7792VXD09SA025Z2R35	25	35	M12	12,50	1,50	2	*015269*	F3508T	*015240*	T15	2,10
030614	7792VXD09SA032Z3R43	32	43	M16	17,00	1,50	3	*015064*	F3510T	*015240*	T15	2,10

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 45.

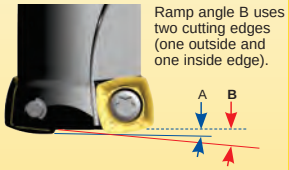
7792VXD09 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle A °	Ramping Angle B °	Helical Hole min. - max.		a_p max Helical / Linear	a_e max Plunging	Max RPM
029461	7792VXD09WA025Z2R	11,75	2.80	6.30	34	48	1,00	6,00	48500
029462	7792VXD09WA032Z3R	18,75	1.50	5.00	48	62	1,00	6,00	40500
031191	7792VXD09CA025Z2R50	11,75	2.80	6.30	34	48	1,00	6,00	48500
031192	7792VXD09CA032Z3R70	18,75	1.50	5.00	48	62	1,00	6,00	40500
029463	7792VXD09-A040Z3R	26,75	0.80	2.70	64	78	1,00	6,00	34500
029464	7792VXD09-A040Z4R	26,75	0.80	2.70	64	78	1,00	6,00	34500
030434	7792VXD09-A040Z5R	26,75	0.80	2.70	64	78	1,00	6,00	34500
030435	7792VXD09-A050Z5R	36,75	0.71	2.31	84	98	1,00	6,00	30000
030436	7792VXD09-A050Z6R	36,75	0.71	2.31	84	98	1,00	6,00	29500
030613	7792VXD09SA025Z2R35	11,75	2.80	6.30	34	48	1,00	6,00	48500
030614	7792VXD09SA032Z3R43	18,75	1.50	5.00	48	62	1,00	6,00	40500





Ramp angle A uses one outside cutting edge only.



Ramp angle B uses two cutting edges (one outside and one inside edge).

A = max ramp angle utilising full face contact

B = max ramp angle utilising full contact + internal corner radius

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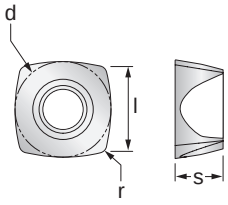
XDLW09-D


XDLT09-D41


XDLT09-D721


XDLT09-D411



Product			Application & Material			Dimensions (mm)				
			Facing	Slotting	Plunging					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max. 1,50	a_p max. 1,50	a_e max. 6,00					
029487	XDLW090408SR-D	X400	◆◆◆	◆◆◆	◆◆◆	9,52	9,52	4,76	0,80	0,10
029485	XDLW090408SR-D	X500	●●●	●●●	●●●	9,52	9,52	4,76	0,80	0,10
029486	XDLW090408SR-D	SC3025	◆	◆	◆	9,52	9,52	4,76	0,80	0,10
029685	XDLT090408ER-D41	X500	■◆◆	■◆◆	■◆◆	9,52	9,52	4,76	0,80	0,05
031535	XDLT090408ER-D41	SP6519	●●◆■●■	●●◆■●■	●●◆■●■	9,52	9,52	4,76	0,80	0,05
033067	XDLT090408ER-D41	SC6525	■■■	■■■	■■■	9,52	9,52	4,76	0,80	0,05
029637	XDLT090408ER-D721	GH2	◆	◆	◆	9,52	9,52	4,76	0,80	0,04
030853	XDLT090412ER-D411	X500	■◆◆	■◆◆	■◆◆	9,52	9,52	4,76	1,20	0,05
030854	XDLT090412ER-D411	SP6519	●●◆■●■	●●◆■●■	●●◆■●■	9,52	9,52	4,76	1,20	0,05

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 19.

XDLW090408SR-D X500 should be used for Alloyed Steel and Stainless Steel with heavy scale.

XDLT090412ER-D411 is a more positive geometry than the -D-41 with a larger radius which increases performance during smaller radial engagements or where chipping may occur when using the -D-41 geometry.

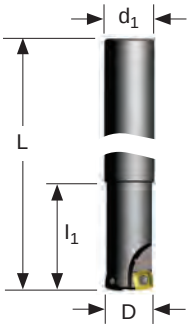
XDLT090412ER-D411 uses less power than the -D-41 geometry.

7792VXD09 Feeds f_z (mm/tooth)

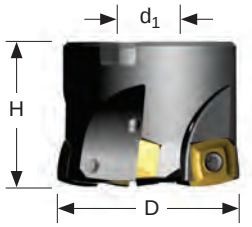
Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,00	0,30 - 1,90	-	-	-	-	-	-	-	-	-	-	-	0,30 - 1,00	0,30 - 1,00
SR-D	X400	Slotting	0,30 - 1,50	0,30 - 1,45	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,60	0,30 - 0,80
SR-D	X400	Plunging	0,10 - 0,25	0,10 - 0,23	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,12	0,10 - 0,12
SR-D	X500	Facing	-	0,30 - 1,90	0,30 - 1,20	0,30 - 1,00	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Slotting	-	0,30 - 1,40	0,30 - 0,90	0,30 - 0,80	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Plunging	-	0,10 - 0,22	0,10 - 0,20	0,10 - 0,15	-	-	-	-	-	-	-	-	-	-	-
SR-D	SC3025	Facing	-	-	-	-	0,30 - 2,00	0,30 - 1,80	0,30 - 1,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 1,70	0,30 - 1,50	0,30 - 1,30	-	-	-	-	-	-	-	-
SR-D	SC3025	Plunging	-	-	-	-	0,10 - 0,25	0,10 - 0,22	0,10 - 0,20	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,00	0,20 - 0,80	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	X500	Slotting	-	-	0,20 - 0,80	0,15 - 0,70	-	-	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D41	X500	Plunging	-	-	0,10 - 0,16	0,08 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-
ER-D41	SP6519	Facing	0,30 - 1,50	0,30 - 1,30	0,20 - 1,00	0,20 - 0,60	0,30 - 1,50	0,30 - 1,30	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	SP6519	Slotting	0,30 - 1,30	0,30 - 1,00	0,20 - 0,80	0,15 - 0,50	0,30 - 1,30	0,30 - 1,00	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D41	SP6519	Plunging	0,10 - 0,20	0,10 - 0,16	0,10 - 0,16	0,05 - 0,08	0,10 - 0,20	0,10 - 0,16	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-
ER-D41	SC6525	Facing	0,30 - 1,45	0,30 - 1,30	-	-	0,30 - 1,50	0,30 - 1,30	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,30 - 1,25	0,30 - 1,00	-	-	0,30 - 1,30	0,30 - 1,00	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,10 - 0,18	0,10 - 0,16	-	-	0,10 - 0,20	0,10 - 0,16	-	-	-	-	-	-	-	-	-
ER-D721	GH2	Facing	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,30	-	-	-	-	-	-
ER-D721	GH2	Slotting	-	-	-	-	-	-	-	0,30 - 1,30	0,30 - 1,00	-	-	-	-	-	-
ER-D721	GH2	Plunging	-	-	-	-	-	-	-	0,10 - 0,20	0,10 - 0,16	-	-	-	-	-	-
ER-D411	X500	Facing	-	-	0,20 - 1,00	0,20 - 0,80	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D411	X500	Slotting	-	-	0,20 - 0,80	0,15 - 0,70	-	-	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D411	X500	Plunging	-	-	0,10 - 0,16	0,08 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-
ER-D411	SP6519	Facing	0,30 - 1,50	0,30 - 1,30	0,20 - 1,00	0,20 - 0,60	0,30 - 1,50	0,30 - 1,30	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D411	SP6519	Slotting	0,30 - 1,30	0,30 - 1,00	0,20 - 0,80	0,15 - 0,50	0,30 - 1,30	0,30 - 1,00	-	-	-	0,10 - 0,50	0,10 - 0,50	0,10 - 0,50	0,10 - 0,70	-	-
ER-D411	SP6519	Plunging	0,10 - 0,20	0,10 - 0,16	0,10 - 0,16	0,05 - 0,08	0,10 - 0,20	0,10 - 0,16	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	-	-

Note: HTA = High Temperature Alloys

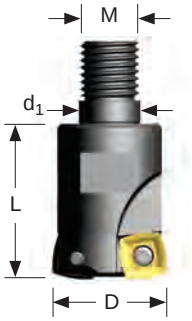
Note: Speed recommendations can be found on page 14.



Cylindrical Shank



Shell Mill Fixation

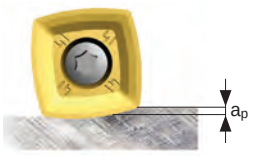


Modular Head

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7792VXD12 Cylindrical Shank												
031195	7792VXD12CA032Z2R70	32	250	70	32	2,50	2	*015262*	D4010T	*015240*	T15	3,10
7792VXD12 Shell Mill Fixation - Coarse, Medium and Fine Pitch												
029467	7792VXD12-A052Z3R	52	40	-	22	2,50	3	*015263*	D4012T	*015240*	T15	3,10
029468	7792VXD12-A052Z4R	52	40	-	22	2,50	4	*015263*	D4012T	*015240*	T15	3,10
030489	7792VXD12-A052Z5R	52	40	-	22	2,50	5	*015262*	D4010T	*015240*	T15	3,10
029469	7792VXD12-A063Z4R	63	40	-	22	2,50	4	*015263*	D4012T	*015240*	T15	3,10
029470	7792VXD12-A063Z5R	63	40	-	22	2,50	5	*015263*	D4012T	*015240*	T15	3,10
031650	7792VXD12-A066Z4R	66	45	-	27	2,50	4	*015263*	D4012T	*015240*	T15	3,10
031651	7792VXD12-A066Z5R	66	45	-	27	2,50	5	*015263*	D4012T	*015240*	T15	3,10
029471	7792VXD12-A080Z5R	80	50	-	27	2,50	5	*015263*	D4012T	*015240*	T15	3,10
030490	7792VXD12-A080Z8R	80	50	-	27	2,50	8	*015263*	D4012T	*015240*	T15	3,10
030443	7792VXD12-A100Z6R	100	50	-	32	2,50	6	*015263*	D4012T	*015240*	T15	3,10
030444	7792VXD12-A100Z9R	100	50	-	32	2,50	9	*015263*	D4012T	*015240*	T15	3,10
030445	7792VXD12-A125Z8R	125	63	-	40	2,50	8	*015263*	D4012T	*015240*	T15	3,10
030446	7792VXD12-A125Z11R	125	63	-	40	2,50	11	*015263*	D4012T	*015240*	T15	3,10
033216	7792VXD12-160Z07R	160	63		40	2.50	7	*015263*	D4012T	*015240*	T15	3,10

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7792VXD12 Modular Head												
030994	7792VXD12SA032Z2R43	32	43	M16	17,00	2,50	2	015262	D4010T	015240	T15	3,10

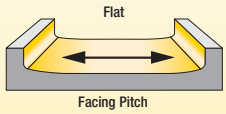
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 45.



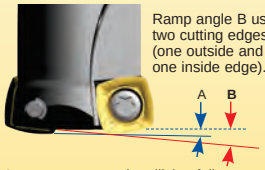
Depth of Cut (ap)

7792VXD12 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle A °	Ramping Angle B °	Helical Hole min.	Helical Hole max.	a_p max Helical / Linear	a_e max Plunging	Max RPM
031195	7792VXD12CA032Z2R70	10,60	1.80	2.60	42	62	1,80	9,00	31500
029467	7792VXD12-A052Z3R	33,60	0.80	2.70	82	102	1,80	9,00	22000
029468	7792VXD12-A052Z4R	33,60	0.80	2.70	82	102	1,80	9,00	22000
030489	7792VXD12-A052Z5R	33,60	0.80	2.70	82	102	1,80	9,00	22000
029469	7792VXD12-A063Z4R	44,60	0.60	1.80	104	124	1,80	9,00	19500
029470	7792VXD12-A063Z5R	44,60	0.60	1.80	104	124	1,80	9,00	19500
031650	7792VXD12-A066Z4R	47,60	0.45	1.80	110	130	1,80	9,00	19000
031651	7792VXD12-A066Z5R	47,60	0.45	1.80	110	130	1,80	9,00	19000
029471	7792VXD12-A080Z5R	61,60	0.45	0.90	138	158	1,80	9,00	17000
030490	7792VXD12-A080Z8R	61,60	0.45	0.90	138	158	1,80	9,00	17000
030443	7792VXD12-A100Z6R	81,60	0.32	1.45	178	198	1,80	9,00	15000
030444	7792VXD12-A100Z9R	81,60	0.32	1.45	178	198	1,80	9,00	15000
030445	7792VXD12-A125Z8R	106,60	0.24	1.06	228	248	1,80	9,00	13000
030446	7792VXD12-A125Z11R	106,60	0.24	1.06	228	248	1,80	9,00	13000
033216	7792VXD12-160Z07R	141,60	0.20	0.86	298	318	1,80	9,00	11500
030994	7792VXD12SA032Z2R43	10,60	1.80	2.60	42	62	1,80	9,00	31500



Ramp angle A uses one outside cutting edge only.



Ramp angle B uses two cutting edges (one outside and one inside edge).

A = max ramp angle utilizing full face contact

B = max ramp angle utilizing full contact + internal corner radius

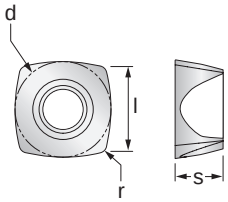
STELLRAM


XDLW12-D


XDLT12-D41


XDLT12-D721


XDLT12-D411



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h_m min
			Depth of Cut (mm)							
			a_p max. 2,50	a_p max. 2,00	a_e max. 9,00					
029490	XDLW120508SR-D	X400	◆◆◆	◆◆◆	◆◆◆	12,70	12,70	5,56	0,80	0,10
029488	XDLW120508SR-D	X500	●●●	●●●	●●●	12,70	12,70	5,56	0,80	0,10
029489	XDLW120508SR-D	SC3025	◆	◆	◆	12,70	12,70	5,56	0,80	0,10
029682	XDLT120508ER-D41	X500	■◆◆	■◆◆	■◆◆	12,70	12,70	5,56	0,80	0,05
031534	XDLT120508ER-D41	SP6519	●●◆■●■	●●◆■●■	●●◆■●■	12,70	12,70	5,56	0,80	0,05
033068	XDLT120508ER-D41	SC6525	■■■	■■■	■■■	12,70	12,70	5,56	0,80	0,05
029638	XDLT120508ER-D721	GH2	◆	◆	◆	12,70	12,70	5,56	0,80	0,04
030783	XDLT120512ER-D411	X500	■◆◆	■◆◆	■◆◆	12,70	12,70	5,56	1,20	0,05
030792	XDLT120512ER-D411	SP6519	●●◆■●■	●●◆■●■	●●◆■●■	12,70	12,70	5,56	1,20	0,05

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 19.

XDLW120508SR-D X500 should be used for Alloyed Steel and Stainless Steel with heavy scale.

XDLT120512ER-D411 is a more positive geometry than the -D41 with a larger radius which increases performance during smaller radial engagements or where chipping may occur when using the -D41 geometry.

XDLT120512ER-D411 uses less power than the -D41 geometry.

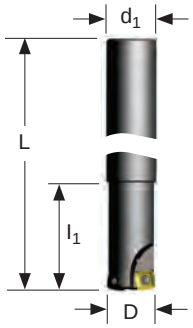
7792VXD12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,70	0,30 - 2,50	-	-	-	-	-	-	-	-	-	-	-	0,30 - 1,20	0,30 - 1,50
SR-D	X400	Slotting	0,30 - 2,50	0,30 - 2,40	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,80	0,30 - 1,00
SR-D	X400	Plunging	0,10 - 0,30	0,10 - 0,25	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,13	0,10 - 0,15
SR-D	X500	Facing	-	0,30 - 2,50	0,20 - 1,70	0,20 -1,20	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Slotting	-	0,30 - 2,40	0,20 - 1,50	0,20 - 1,00	-	-	-	-	-	-	-	-	-	-	-
SR-D	X500	Plunging	-	0,10 - 0,24	0,10 - 0,25	0,10 - 0,18	-	-	-	-	-	-	-	-	-	-	-
SR-D	SC3025	Facing	-	-	-	-	0,30 - 3,00	0,30 - 2,80	0,30 - 2,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 2,50	0,30 - 2,30	0,30 - 2,10	-	-	-	-	-	-	-	-
SR-D	SC3025	Plunging	-	-	-	-	0,10 - 0,30	0,10 - 0,28	0,10 - 0,25	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,40	0,20 - 0,90	-	-	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D41	X500	Slotting	-	-	0,20 - 1,10	0,20 - 0,80	-	-	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D41	X500	Plunging	-	-	0,10 - 0,20	0,08 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SP6519	Facing	0,30 - 2,50	0,30 - 2,00	0,20 - 1,20	0,20 - 0,75	0,30 - 2,50	0,30 - 2,30	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D41	SP6519	Slotting	0,30 - 2,00	0,30 - 1,60	0,20 - 1,00	0,15 - 0,60	0,30 - 2,00	0,30 - 1,80	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D41	SP6519	Plunging	0,10 - 0,22	0,10 - 0,18	0,10 - 0,18	0,05 - 0,10	0,10 - 0,22	0,10 - 0,18	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SC6525	Facing	0,30 - 2,40	0,30 - 2,00	-	-	0,30 - 2,50	0,30 - 2,30	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,30 - 1,90	0,30 - 1,60	-	-	0,30 - 2,00	0,30 - 1,80	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,10 - 0,20	0,10 - 0,18	-	-	0,10 - 0,22	0,10 - 0,18	-	-	-	-	-	-	-	-	-
ER-D721	GH2	Facing	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,50	-	-	-	-	-	-
ER-D721	GH2	Slotting	-	-	-	-	-	-	-	0,30 - 1,50	0,30 - 1,50	-	-	-	-	-	-
ER-D721	GH2	Plunging	-	-	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	-	-	-	-	-	-
ER-D411	X500	Facing	-	-	0,20 - 1,40	0,20 - 0,90	-	-	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D411	X500	Slotting	-	-	0,20 - 1,10	0,20 - 0,80	-	-	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D411	X500	Plunging	-	-	0,10 - 0,20	0,08 - 0,14	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D411	SP6519	Facing	0,30 - 2,50	0,30 - 2,30	0,20 - 1,20	0,20 - 0,75	0,30 - 2,50	0,30 - 2,30	-	-	-	0,20 - 0,85	0,20 - 0,85	0,20 - 0,85	0,20 - 1,00	-	-
ER-D411	SP6519	Slotting	0,30 - 2,00	0,30 - 1,80	0,20 - 1,00	0,15 - 0,60	0,30 - 2,00	0,30 - 1,80	-	-	-	0,10 - 0,70	0,10 - 0,70	0,10 - 0,70	0,10 - 0,80	-	-
ER-D411	SP6519	Plunging	0,10 - 0,22	0,10 - 0,18	0,10 - 0,18	0,05 - 0,10	0,10 - 0,22	0,10 - 0,18	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-

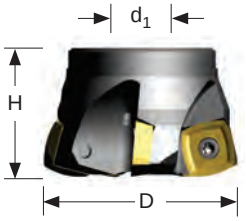
Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page 14.

STELLRAM



Cylindrical Shank

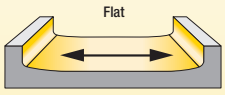


Shell Mill Fixation

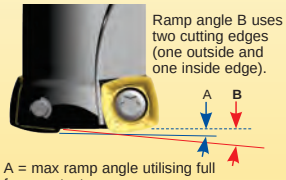
Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7792VXE16 Cylindrcal Shank												
034851	7792VXE16CA040Z2R102	40	172	102	40	3,50	2	*031225*	DP5013T	*030819*	TP20	6,10
034852	7792VXE16CA050Z3R102	50	172	102	40	3,50	3	*031225*	DP5013T	*030819*	TP20	6,10
7792VXE16 Shell Mill Fixation												
031277	7792VXE16-A063Z5R	63	40	-	22	3,50	5	*031225*	DP5013T	*030819*	TP20	6,10
031278	7792VXE16-A080Z6R	80	50	-	27	3,50	6	*031225*	DP5013T	*030819*	TP20	6,10
031279	7792VXE16-A100Z8R	100	50	-	32	3,50	8	*031225*	DP5013T	*030819*	TP20	6,10
031280	7792VXE16-A125Z10R	125	63	-	40	3,50	10	*031225*	DP5013T	*030819*	TP20	6,10
031281	7792VXE16-160Z12	160	63	-	40	3,50	12	*031225*	DP5013T	*030819*	TP20	6,10

7792VXE16 Technical Information (mm)

Product		Dimensions							
EDP	Item Description	Facing Pitch	Ramping Angle A °	Ramping Angle B °	Helical Hole min.	Helical Hole max.	a_p max Helical / Linear	a_e max Plunging	Max RPM
034851	7792VXE16CA040Z2R102	16,10	2.55	3.35	50	78	2.50	13.00	33000
034852	7792VXE16CA050Z3R102	25,83	1.36	2.85	70	98	2.50	13.00	27500
031277	7792VXE16-A063Z5R	37,45	0.86	1.00	96	124	2.50	13,00	22000
031278	7792VXE16-A080Z6R	54,45	0.58	0.65	130	158	2.50	13,00	19000
031279	7792VXE16-A100Z8R	74,45	0.42	0.51	170	198	2.50	13,00	16500
031280	7792VXE16-A125Z10R	99,45	0.32	0.37	220	248	2.50	13,00	14500
031281	7792VXE16-160Z12	134,50	0.23	0.27	290	318	2.50	13,00	12500



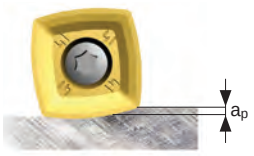
Ramp angle A uses one outside cutting edge only.



Ramp angle B uses two cutting edges (one outside and one inside edge).

A = max ramp angle utilising full face contact

B = max ramp angle utilising full contact + internal corner radius



Depth of Cut (ap)

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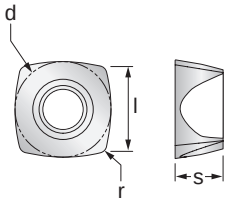
XELW16-D


XELT16-D41



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Facing	Slotting	Plunging	d (IC)	l	s	r	h_m min
			Depth of Cut (mm)							
			a_p max. 3,50	a_p max. 3,00	a_e max.13,00					
031291	XELW160512SR-D	X400	♦♦♦	♦♦♦	♦♦♦	16,80	16,80	5,56	1,20	0,12
031292	XELW160512SR-D	SC3025	♦	♦	♦	16,80	16,80	5,56	1,20	0,12
031293	XELT160512ER-D41	X500	■♦♦	■♦♦	■♦♦	16,80	16,80	5,56	1,20	0,12
031294	XELT160512ER-D41	SP6519	●●♦□●■	●●♦□●■	●●♦□●■	16,80	16,80	5,56	1,20	0,12
033069	XELT160512ER-D41	SC6525	■■■	■■■	■■■	16,80	16,80	5,56	1,20	0,12

Machining Choice: ♦ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 19.

7792VXE16 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
SR-D	X400	Facing	0,30 - 2,00	0,30 - 1,80	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,80	0,30 - 1,00
SR-D	X400	Slotting	0,30 - 1,70	0,30 - 1,50	-	-	-	-	-	-	-	-	-	-	-	0,30 - 0,50	0,30 - 0,60
SR-D	X400	Plunging	0,10 - 0,27	0,10 - 0,22	-	-	-	-	-	-	-	-	-	-	-	0,10 - 0,10	0,10 - 0,12
SR-D	SC3025	Facing	-	-	-	-	0,30 - 2,00	0,30 - 1,80	0,30 - 1,50	-	-	-	-	-	-	-	-
SR-D	SC3025	Slotting	-	-	-	-	0,30 - 1,50	0,30 - 1,30	0,30 - 1,20	-	-	-	-	-	-	-	-
SR-D	SC3025	Plunging	-	-	-	-	0,10 - 0,20	0,10 - 0,18	0,10 - 0,15	-	-	-	-	-	-	-	-
ER-D41	X500	Facing	-	-	0,20 - 1,00	0,20 - 0,60	-	-	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	X500	Slotting	-	-	0,20 - 0,80	0,20 - 0,50	-	-	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,50	-	-
ER-D41	X500	Plunging	-	-	0,12 - 0,16	0,07 - 0,13	-	-	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SP6519	Facing	0,30 - 1,50	0,30 - 1,30	0,20 - 1,00	0,20 - 0,50	0,30 - 1,50	0,30 - 1,20	-	-	-	0,20 - 0,60	0,20 - 0,60	0,20 - 0,60	0,20 - 0,80	-	-
ER-D41	SP6519	Slotting	0,30 - 1,30	0,30 - 1,20	0,20 - 0,80	0,20 - 0,45	0,30 - 1,20	0,30 - 1,10	-	-	-	0,10 - 0,40	0,10 - 0,40	0,10 - 0,40	0,10 - 0,50	-	-
ER-D41	SP6519	Plunging	0,10 - 0,23	0,10 - 0,20	0,12 - 0,16	0,07 - 0,12	0,10 - 0,20	0,10 - 0,16	-	-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,10	0,05 - 0,12	-	-
ER-D41	SC6525	Facing	0,30 - 1,40	0,30 - 1,20	-	-	0,30 - 1,50	0,30 - 1,20	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Slotting	0,30 - 1,20	0,30 - 1,10	-	-	0,30 - 1,20	0,30 - 1,10	-	-	-	-	-	-	-	-	-
ER-D41	SC6525	Plunging	0,10 - 0,20	0,10 - 0,18	-	-	0,10 - 0,20	0,10 - 0,16	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page 14.

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Speed v_c (m/min)

7792VX Series

Wear Resistance: – ⟵ +

Speed min. - max.

Coolant Recommendation
Recommended ● Possible ◉

ISO	Materials	Rm and Hardness	PVD X Grade		CVD X Grade		PVD Standard		Uncoated Micrograin		CVD Standard		CVD Standard
			💧	🚫	💧	🚫	💧	🚫	💧	🚫	💧	🚫	💧	🚫	💧
			X400		X500		SP6519		GH2		SC6525		SC3025
P	Unalloyed Steel	<600 N/mm² <180 HBN	◉	●	120 - 260		◉	●	130 - 295				◉	●	140 - 370			
		<950 N/mm² <280 HBN			105 - 230				115 - 260						120 - 325			
	Alloyed Steel	700-950 N/mm² 200-280 HBN	◉	●	95 - 200	◉	●	100 - 210	◉	●	100 - 230			◉	●	105 - 290			
		950-1200 N/mm² 280-355 HBN			70 - 150			75 - 160			75 - 175					80 - 210			
		1200-1400 N/mm² 355-415 HBN		●	45 - 95		●	50 - 100		●	50 - 110				●	50 - 140			
M	Stainless Steel	Austenitic + Ferritic 300 series				◉	●	115 - 250	◉	●	115 - 270								
		Martensitic 400 series						100 - 220			105 - 235								
	PH Stainless	Refractory P.H.				●		50 - 110	●		50 - 120								
K	Cast Iron	Grey GG-Ft									140 - 295					145 - 390			150 - 395
		Spheroidal-Ductile GGG-FGS							◉	●	110 - 240				●	115 - 305		●	120 - 335
		Malleable GTS - MN/MP									100 - 220								105 - 275
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN							●		305 - 2130	●		400 - 2745					
		Aluminium + Silicon > 16% Si 92 HBN									245 - 1760			295 - 2135					
S	High Temperature Alloys	Iron Based				●		23 - 48	●		23 - 55								
		Cobalt Based						21 - 44			22 - 48								
		Nickel Based						24 - 51			25 - 55								
		Titanium Based						35 - 73			36 - 79								
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN		●	45 - 95														
		Chilled Cast Iron >1400 N/mm² > 400 HBN			35 - 80														

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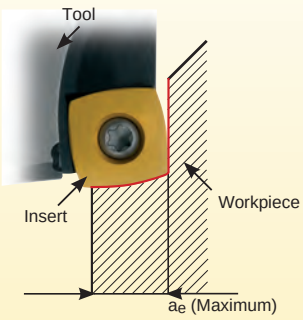
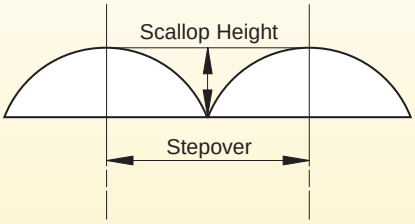
Plunging





The cutting edge should not be in contact with the material face after machining to maintain the cutting edge quality.

The scallop height is calculated in relation to the step over.

The maximum radial engagement is directly in relation to insert cutting edge length.

For insert type: **XP…06 the a_e, max is 3mm.**

For insert type: **XD…09 the a_e, max is 6mm.**

For insert type: **XD…12 the a_e, max is 9mm.**

For insert type: **XE…16 the a_e, max is 13mm.**

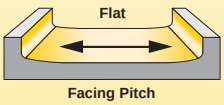
Plunging Information (mm) tool definition-scallop height and step over

	Tool definition (mm)																			
	7792VXP06				7792VXD09				7792VXD12								7792VXE16			
Diameter	16	20	25	32	25	32	40	50	32	52	63	66	80	100	125	160	63	80	100	125	160
Insert size	6	6	6	6	9	9	9	9	12	12	12	12	12	12	12	12	16	16	16	16	16
a_e max	3	3	3	3	6	6	6	6	9	9	9	9	9	9	9	9	13	13	13	13	13
Scallop height	Step over (mm)																				
0,25	3,97	4,44	4,97	5,63	4,97	5,63	6,30	7,05	5,63	7,19	7,92	8,11	8,93	9,99	11,17	12,64	7,92	8,93	9,99	11,17	12,64
0,50	5,57	6,24	7,00	7,94	7,00	7,94	8,89	9,95	7,94	10,15	11,18	11,44	12,61	14,11	15,78	17,86	11,18	12,61	14,11	15,78	17,86
0,75	6,76	7,60	8,53	9,68	8,53	9,68	10,85	12,16	9,68	12,40	13,67	13,99	15,42	17,26	19,31	21,86	13,67	15,42	17,26	19,31	21,86
1,00	7,75	8,72	9,80	11,14	9,80	11,14	12,49	14,00	11,14	14,28	15,75	16,12	17,78	19,90	22,27	25,22	15,75	17,78	19,90	22,27	25,22
2,00	10,58	12,00	13,56	15,49	13,56	15,49	17,44	19,60	15,49	20,00	22,09	22,63	24,98	28,00	31,37	35,55	22,09	24,98	28,00	31,37	35,55
3,00	12,49	14,28	16,25	18,65	16,25	18,65	21,07	23,75	18,65	24,25	26,83	27,49	30,40	34,12	38,26	43,41	26,83	30,40	34,12	38,26	43,41
4,00					18,33	21,17	24,00	27,13	21,17	27,71	30,72	31,50	34,87	39,19	44,00	49,96	30,72	34,87	39,19	44,00	49,96
5,00					20,00	23,24	26,46	30,00	23,24	30,66	34,06	34,93	38,73	43,59	48,99	55,68	34,06	38,73	43,59	48,99	55,68
6,00					21,35	24,98	28,57	32,49	24,98	33,23	36,99	37,95	42,14	47,50	53,44	60,79	36,99	42,14	47,50	53,44	60,79
7,00									26,46	35,50	39,60	40,64	45,21	51,03	57,48	65,45	39,60	45,21	51,03	57,48	65,45
8,00									27,71	37,52	41,95	43,08	48,00	54,26	61,19	69,74	41,95	48,00	54,26	61,19	69,74
9,00									28,77	39,34	44,09	45,30	50,56	57,24	64,62	73,73	44,09	50,56	57,24	64,62	73,73
10,00																	46,04	52,92	60,00	67,82	77,46
11,00																	47,83	55,10	62,58	70,82	80,97
12,00																	49,48	57,13	64,99	73,65	84,29
13,00																	50,99	59,03	67,26	76,32	87,43

Max. flat surface (mm)

Insert size	Cutter dia.	Pitch
06	16	7,60
	20	11,60
	25	16,60
	32	23,60
09	25	11,75
	32	18,75
	40	26,75
	50	36,75
12	32	10,60
	52	33,60
	63	44,60
	66	47,60
	80	61,60
	100	81,60
	125	106,60
	160	141,60
16	63	37,45
	80	54,45
	100	74,45
	125	99,45
	160	134,50


Helical Interpolation



Facing Pitch

Helical interpolation capacity for 7792VX (mm)

Insert Size	Cutter dia.	Hole min.	Hole max.
06	16	22	30
	20	30	38
	25	40	48
	32	54	62
09	25	34	48
	32	48	62
	40	64	78
	50	84	98
12	32	42	62
	52	82	102
	63	104	124
	66	110	130
	80	138	158
	100	178	198
	125	228	248
	160	298	318
16	63	96	124
	80	130	158
	100	170	198
	125	220	248
	160	290	318

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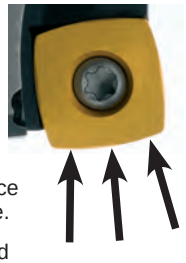
The advantages of face milling and producing cavities with Stellram's high feed face mill are numerous.

The unique design of the insert, approach angle and the cutter body ensure the cutting forces are predominantly directed in the axial direction. The example shown with a round insert tool shows complex forces which result in high levels of vibration and damage to the cutting edge.

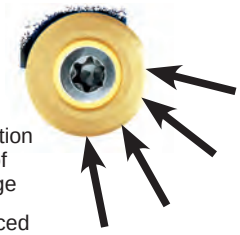
7792VX

- Cutting forces predominantly axial
- Relationship between cutting edge and work piece is at its most stable.
- Results in high feed rates and consistent tool life.



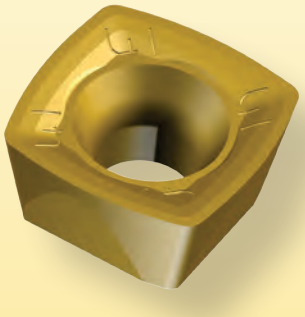
Round Insert Tools

- Tangential forces act around the radius
- Leads to vibration and damage of the cutting edge
- Leads to reduced feed and lower productivity



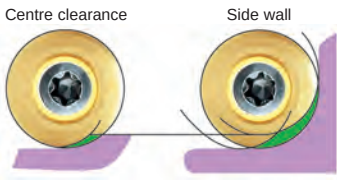
The 7792VX machines with a constant volume of chip throughout all aspects of producing cavities and produces a side wall that is close to profile.

Round insert tools have increasing chip volume through the process.



7792VX

- Constant cutting section (chip volume) irrespective of position in cavity.
- Producing a close to profile side wall.
- Near-square side walls possible.



Round insert

- Greater surface contact.
- Increased chip section for side wall machining.
- Vibration in corners.
- Undulating side wall cusps.

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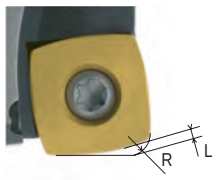
CNC Program - Corner Radius Definition

The use of common CAD / CAM systems requires a round insert dimension to be known for cavity machining. This is available with 7792VX cutters as shown to the right and in the reference table.

For finish pass applications:

Wiper Facet for finishing use max. feed 0,80mm/Revolution



Programming Data (mm)			
Insert size (mm)	Radius	R	L
06	0,80	1,37	0,40
09	0,80	2,01	0,73
	1,20	2,27	0,67
12	0,80	2,50	1,02
	1,20	2,73	0,97
16	1,20	4,18	1,46

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
a_p = Depth of cut
f_z = Feed per tooth
d = Insert diameter 45mm

Theoretical Diameter for all high feed insert sizes = 45mm

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
a_e = Radial engagement
f_z = Feed per tooth
d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

7792 Case Histories

Material: 4140 steel – 280 - 320 HBN
Industry: Die/Mold
Job: 17 holes – 51,59mm diameter, 67,74mm deep
Cycle time: 4.5 hours

7792 Solution:
Cutter: Modular 7792VXD09 (25mm Cutter)
Extension: Anti-vibration, heavy-alloy Modular Shank
Insert Grade: X400
Process: High Feed Helical Interpolation
Cycle time: 1 minute 45 seconds per hole
Total Cycle time: 30 minutes

90% Reduction in Cycle Time

Material: 6-4 Titanium
Job: Machine pockets in aerospace component
Cycle time: 5.5 hours

7792 Solution:
Cutter: 7792VXD12 (160mm Cutter)
Insert Grade: X500
Cycle time: 1 hour 20 minutes

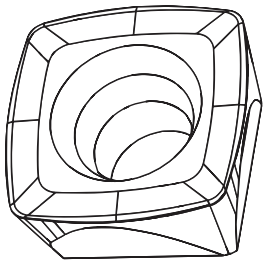
75% Reduction in Cycle Time

Material: 6-4 Titanium
Job: Turn a 1463mm diameter by 340mm deep ring
Industry: Aerospace
Turning Cycle time: 4 hours 35 minutes

7792 Solution:
Cutter: 7792VXE16 (125mm Cutter)
Insert Grade: X500
Process: Mill turning
Workpiece rotates on B axis at 0,26 RPM
Spiral milling feed rate of 60mm per revolution
Cycle time: 2 hours 24 minutes

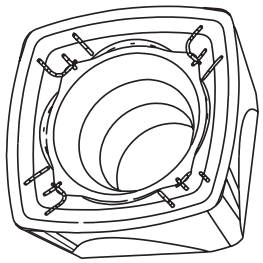
Spiral Milling Cuts Cycle Time 48%

High Feed Geometries



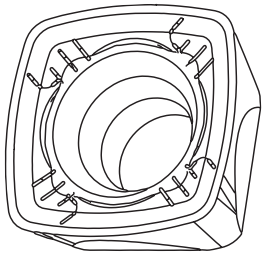
-D P P K H

Fully ground with flat top and variable hone.
Hardened Materials up to 480HBN.



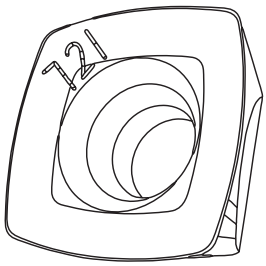
-D41 M M S

Positive geometry that reduces power consumption.



-D411 M M S

Positive geometry with larger corner radius (1,2mm) reduces cutting energy and provides better edge protection during lower radial engagement applications.



-D721 N

Positive, periphery ground, polished top rake face and sharp edge allows a freer cutting action and reduces built-up edge.

Material Guide – Key to Recommended Inserts

Material Designation														
P	Unalloyed Steels	P	Alloyed Steels	M	Stainless Steels	M	PH Stainless	K	Cast Irons	N	Aluminum & Alloys	S	High Temp. Alloys	H	Hard Materials

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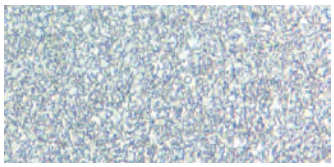
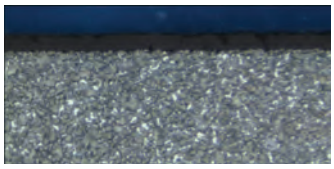
High Feed Grades



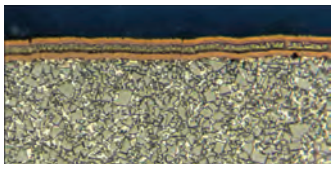
GH2 N

Uncoated Micrograin – Tough and able to handle high pressure, vibration and shock.



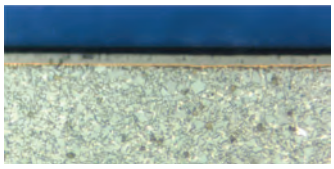
X400 P P H

Coating Type: PVD, TiAlN – Designed for high metal removal rates and interrupted cuts.



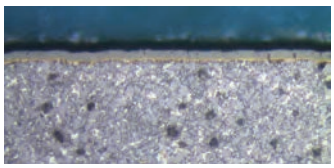
X500 M S

Coating Type: CVD, TiN-TiC-TiN – High level of shock resistance; operates at low to medium cutting speeds; high metal removal rates.



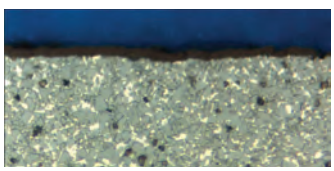
SC3025 K

Coating Type: CVD, TiN - TiCN - Al_2O_3 – Multi-layer CVD coating offers wear and abrasion resistance.



SC6525 P P K

Coating Type: CVD, TiN-TiCN-Al_2O_3 – High Performance Machining at elevated surface speeds.

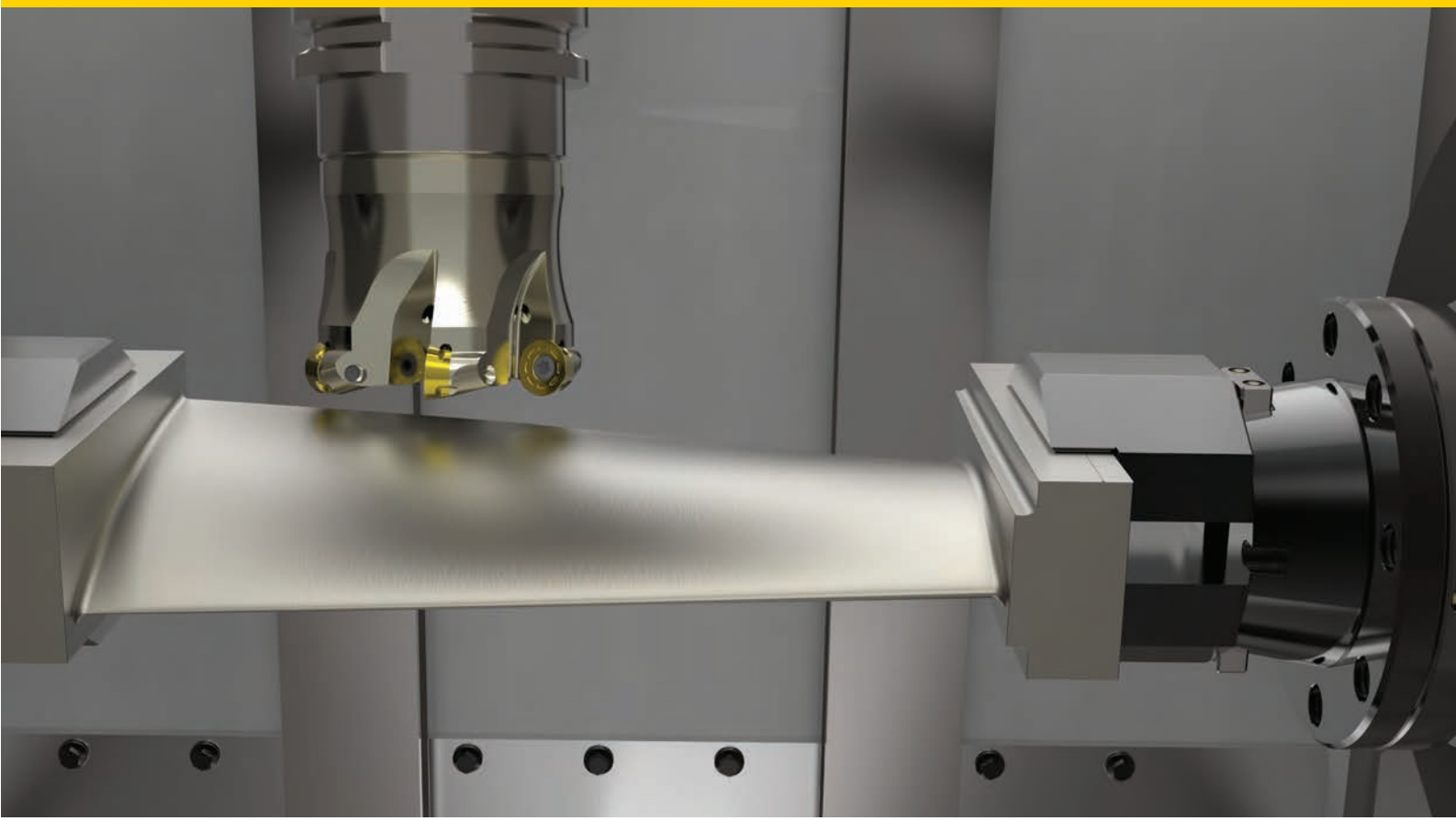


SP6519 M

Coating Type: PVD, TiAlN – Super nano coating is extremely hard for unmatched performance and virtually eliminates residual stress.

Material Guide – Key to Recommended Inserts

Material Designation							
P Unalloyed Steels	P Alloyed Steels	M Stainless Steels	M PH Stainless	K Cast Irons	N Aluminum & Alloys	S High Temp. Alloys	H Hard Materials



The *77* Family

- Patented Cutter Designs
- Patented Insert Designs
- Patented Grades

Excellent for roughing, semi-finishing and finishing of high-performance materials

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The 77 Family

Modular
16mm – 40mm

Weldon
25mm

Cylindrical
16mm – 32mm

Shell
40mm – 160mm

Three Families of Cutters are Featured:

- **7700VR08** small diameter standard button cutters (Cylindrical, Weldon and Modular: 16mm to 32mm)
- **7710VRD20** Anti-Rotation Shell Mill cutters (63mm to 160mm)
- **7713VR10 and 12** Patented Anti-Rotation Cutters (Cylindrical, Modular and Shell: 20mm to 80mm)

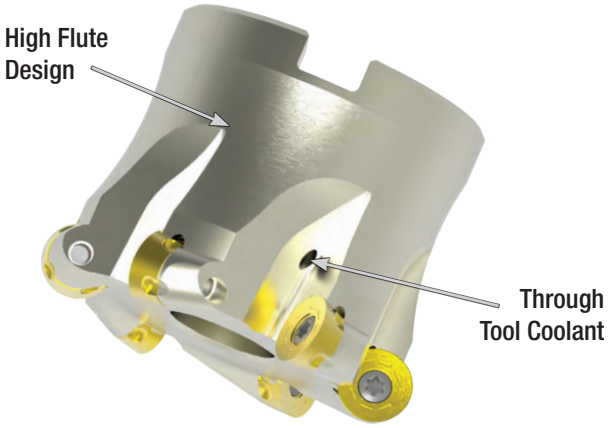
This collection of cutters shows the dynamics of Kennametal technology—taking the conventional to the highest level to machine the toughest high performance alloys.

Continuous Cutting Under the Toughest Conditions

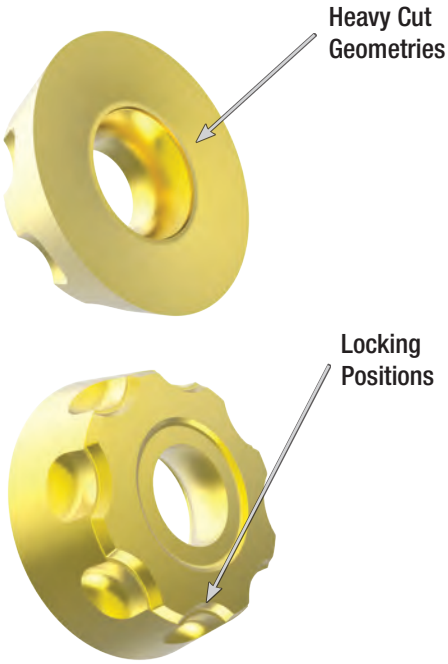
- Cutter diameters from 16mm to 160mm
- Maximum number of teeth for heavy feed operations
- Medium and close pitch cutters available
- Round button insert for maximum strength
- 8mm to 20mm insert diameters
- Low cutting forces
- Flute design maximizes chip evacuation
- Satin Silver coating extends cutter body life (only 7713VR series)
- Modular tools feature an Anti-Vibration Tungsten Extension with Through Coolant

VRD / VR Anti-Rotation Technology

Maximum Chip Evacuation



Maximum Tool Life



The High Flute Indexing Cutter

The 7710 and 7713 series cutters feature a unique patented pocket system that locks the inserts into position to prevent inserts from moving during heavy machining.

- Through Coolant and unique flow through pocket design maximise chip evacuation and increase tool life

7713 Patented series cutter bodies are armored with Satin Silver plating to protect body integrity in milling high performance materials.

The Positive Indexing Round Insert

The Anti-Rotation insert features four, five or eight locking positions which mate with the pocket of the cutter body.

- Positive positioning of the insert throughout the heaviest cuts
- Maximum indexes to optimize tool life and reduce tooling costs

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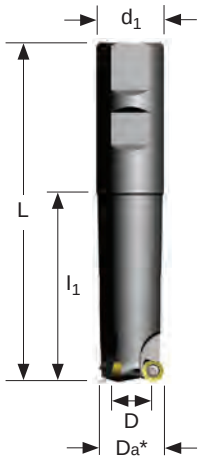
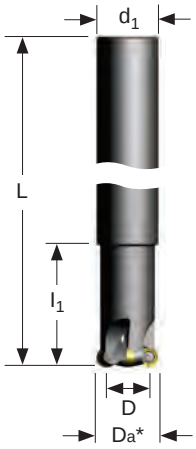


Weldon Shank

Product		Dimensions (mm)							Spares				
EDP	Item Description	D_a*	D	L/H	l_1	d_1	a_p max	No. of teeth	*EDP*		*EDP*		Screw Tightening Nm
	7700VR08 Weldon Shank												
021732	7700VR08WA025R070-M3	25	17	126	70	25	4	3	*015062*	F3006T	*013214*	T9	1,40
021733	7700VR08WA025R124-M3	25	17	180	124	25	4	3	*015062*	F3006T	*013214*	T9	1,40
	7700VR08 Cylindrical Shank - Medium and Fine Pitch												
031134	7700VR08CA020Z3R40	20	12	180	40	20	4	3	*015062*	F3006T	*013214*	T9	1,40
031135	7700VR08CA025Z3R50	25	17	200	50	25	4	3	*015062*	F3006T	*013214*	T9	1,40
031602	7700VR08CA025Z4R50	25	17	200	50	25	4	4	*015062*	F3006T	*013214*	T9	1,40
031137	7700VR08CA032Z4R70	32	24	250	70	32	4	4	*015062*	F3006T	*013214*	T9	1,40
031081	7700VR08CA032Z5R70	32	24	250	70	32	4	5	*015062*	F3006T	*013214*	T9	1,40

D = Effective Diameter (Axis) from insert centreline to centreline.

D_a* = Outside Diameter



Cylindrical Shank

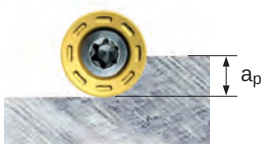
Product		Dimensions (mm)							Spares				
EDP	Item Description	D_a*	D	L/H	M	d_1	a_p max	No. of teeth	*EDP*		*EDP*		Screw Tightening Nm
	7700VR08 Modular Head - Medium and Fine Pitch												
031124	7700VR08SA016Z2R25	16	8	25	M8	8.5	4	2	*015062*	F3006T	*013214*	T9	1,40
031125	7700VR08SA020Z3R25	20	12	25	M10	10.5	4	3	*015062*	F3006T	*013214*	T9	1,40
031126	7700VR08SA025Z3R35	25	17	35	M12	12.5	4	3	*015062*	F3006T	*013214*	T9	1,40
031127	7700VR08SA025Z4R35	25	17	35	M12	12.5	4	4	*015062*	F3006T	*013214*	T9	1,40
031080	7700VR08SA032Z5R35	32	24	35	M16	17.0	4	5	*015062*	F3006T	*013214*	T9	1,40

D = Effective Diameter (Axis) from insert centreline to centreline.

D_a* = Outside Diameter

Note: For Cylindrical Shank extensions in high density alloy with through coolant refer to page 45.

Modular Head



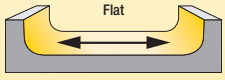
Depth of Cut (ap)

7700VR08 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
021732	7700VR08WA025R070-M3	17	7.85	36	48	2,67	68000
021733	7700VR08WA025R124-M3	17	7.85	36	48	2,67	68000
031134	7700VR08CA020Z3R40	12	9.10	26	38	2,67	81000
031135	7700VR08CA025Z3R50	17	7.85	36	48	2,67	68000
031602	7700VR08CA025Z4R50	17	7.85	36	48	2,67	68000
031137	7700VR08CA032Z4R70	24	6.75	50	62	2,67	57000
031081	7700VR08CA032Z5R70	24	6.75	50	62	2,67	57000
031124	7700VR08SA016Z2R25	8	32.60	18	30	2,67	99000
031125	7700VR08SA020Z3R25	12	12.70	26	38	2,67	81000
031126	7700VR08SA025Z3R35	17	7.85	36	48	2,67	68000
031127	7700VR08SA025Z4R35	17	7.85	36	48	2,67	68000
031080	7700VR08SA032Z5R35	24	7.20	50	62	2,67	57000

Ramping

Helical Interpolation



Facing Pitch

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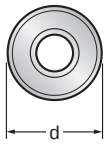
RPEX08-701


RPMT08-41


RPHT08-422



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max -	a_p min - max 0.,80 - 1,50	a_p min - max 0,10 - 0,80					
034544	RPEX0803M3F-701	SP4019	-	■	■■	8,00	-	3,18	4,00	0,02
023315	RPEX0803M3F-701	GH1	-	◆	◆	8,00	-	3,18	4,00	0,02
031312	RPEX0803M3E-701	X500	-	●	-	8,00	-	3,18	4,00	0,02
034543	RPEX0803M3E-701	SP6519	-	-	◆■●	8,00	-	3,18	4,00	0,02
015220	RPMT0803M3E-41	X500	-	●●		8,00	-	3,18	4,00	0,02
031473	RPMT0803M3E-41	SP6519	-	■■●	■■●●■	8,00	-	3,18	4,00	0,02
017308	RPMT0803M3E-41	MP91M	-	●◆	●◆	8,00	-	3,18	4,00	0,02
031186	RPHT0803M3E-422	X500	-	●■◆	●	8,00	-	3,18	4,00	0,03
031187	RPHT0803M3E-422	SP6519	-	◆◆■■	◆◆■●●	8,00	-	3,18	4,00	0,03

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 46.

7700VR08 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701	SP4019	Contouring	-	-	-	-	-	-	-	0,02 - 0,08	0,02 - 0,06	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,09	-	-
F-701	GH1	Contouring	-	-	-	-	-	-	-	0,02 - 0,08	0,02 - 0,06	-	-	-	-	-	-
E-701	X500	Contouring	-	-	-	-	-	-	-	-	-	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,09	-	-
E-701	SP6519	Contouring	-	-	0,02 - 0,10	0,02 - 0,08	-	-	-	-	-	0,02 - 0,06	0,02 - 0,06	0,02 - 0,07	0,02 - 0,09	-	-
E-41	X500	Contouring	-	-	0,03 - 0,12	0,03 - 0,10	-	-	-	-	-	-	-	-	-	-	-
E-41	SP6519	Contouring	0,03 - 0,14	0,03 - 0,12	0,03 - 0,12	0,03 - 0,10	0,03 - 0,14	0,03 - 0,14	0,03 - 0,12	-	-	-	-	-	-	-	-
E-41	MP91M	Contouring	0,03 - 0,13	-	-	-	0,03 - 0,13	0,03 - 0,13	0,03 - 0,11	-	-	-	-	-	-	-	-
E-422	X500	Contouring	-	0,03 - 0,12	0,03 - 0,14	0,03 - 0,11	-	-	-	-	-	0,03- 0,08	0,03 - 0,08	0,03 - 0,09	0,03 - 0,11	-	-
E-422	SP6519	Contouring	0,03 - 0,14	0,03 - 0,12	0,03 - 0,14	0,03 - 0,11	0,03 - 0,14	0,03 - 0,14	0,03 - 0,12	-	-	0,03 - 0,08	0,03 - 0,08	0,03 - 0,09	0,03 - 0,11	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page 26.

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Speed v_c (m/min)

7700VR Series

Wear Resistance: – ⟵ +

Speed min. - max.

Coolant Recommendation: Recommended ● Possible ⦿

ISO	Materials	Rm and Hardness			CVD X Grade			PVD X Grade			PVD Standard			Uncoated Micrograin			PVD Standard			CVD Standard			Uncoated Micrograin
					X500			X700			SP6519			GH2			SP4019			MP91M			GH1
P	Unalloyed Steel	<600 N/mm² <180 HBN	⦿	●	130 - 270				⦿	●	130 - 295					●	140 - 315		●	140 - 345			
		<950 N/mm² <280 HBN			115 - 240						115 - 260						120 - 275			120 - 305			
	Alloyed Steel	700-950 N/mm² 200-280 HBN	⦿	●	100 - 210				⦿	●	100 - 230					●	105 - 245		●	105 - 270			
		950-1200 N/mm² 280-355 HBN			75 - 160						75 - 175						80 - 190			80 - 205			
		1200-1400 N/mm² 355-415 HBN		●	50 - 100					●	50 - 110					●	50 - 120		●	50 - 130			
M	Stainless Steel	Austenitic + Ferritic 300 series	⦿	●	115 - 250	⦿	●	115 - 260	⦿	●	115 - 270				⦿	●	120 - 280						
		Martensitic 400 series			100 - 220			105 - 230			105 - 235						110 - 250						
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 115	●		50 - 120				●		50 - 130						
K	Cast Iron	Grey GG-Ft	⦿	●	120 - 280				⦿	●	140 - 295					●	145 - 330		●	145 - 365			
		Spheroidal-Ductile GGG-FGS			105 - 205						110 - 240						115 - 255			115 - 285			
		Malleable GTS - MN/MP			95 - 170						100 - 220						105 - 235			105 - 260			
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN										●		400 - 2745	●		400 - 2895				●		400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN												295 - 2135			295 - 2320						295 - 2440
S	High Temperature Alloys	Iron Based	●		23 - 48	●		23 - 52	●		23 - 55				●		24 - 63						
		Cobalt Based			21 - 44			22 - 46			22 - 48						23 - 52						
		Nickel Based			24 - 51			25 - 53			25 - 55						26 - 59						
		Titanium Based			35 - 73			36 - 75			36 - 79						37 - 84						
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN																					
		Chilled Cast Iron >1400 N/mm² > 400 HBN																					

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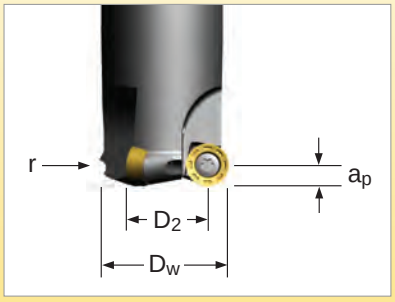
7700VR Technical Information



Working Diameter:

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where:
- D_w = Working Diameter
- D_z = Diameter of cutter insert centre to centre
- r = Insert radius
- a_p = Axial Depth of Cut

7710VR Technical Information

where:
- f_z = Feed per tooth
- h_m = Average chip thickness
- r = Insert radius
- a_e = Radial Depth of Cut
- a_p = Axial Depth of Cut

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2-(r-a_e)^2}}{r} \times \frac{\sqrt{r^2-(r-a_p)^2}}{r}}$$

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2-(r-a_e)^2}}{r} \times \frac{\sqrt{r^2-(r-a_p)^2}}{r}$$

Simplified formulas to evaluate h_m and f_z based on radial engagement or depth of cut.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

- h_m = Average chip thickness
- a_p = Depth of cut
- f_z = Feed per tooth
- d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

- h_m = Average chip thickness
- a_e = Radial engagement
- f_z = Feed per tooth
- d = Cutter diameter

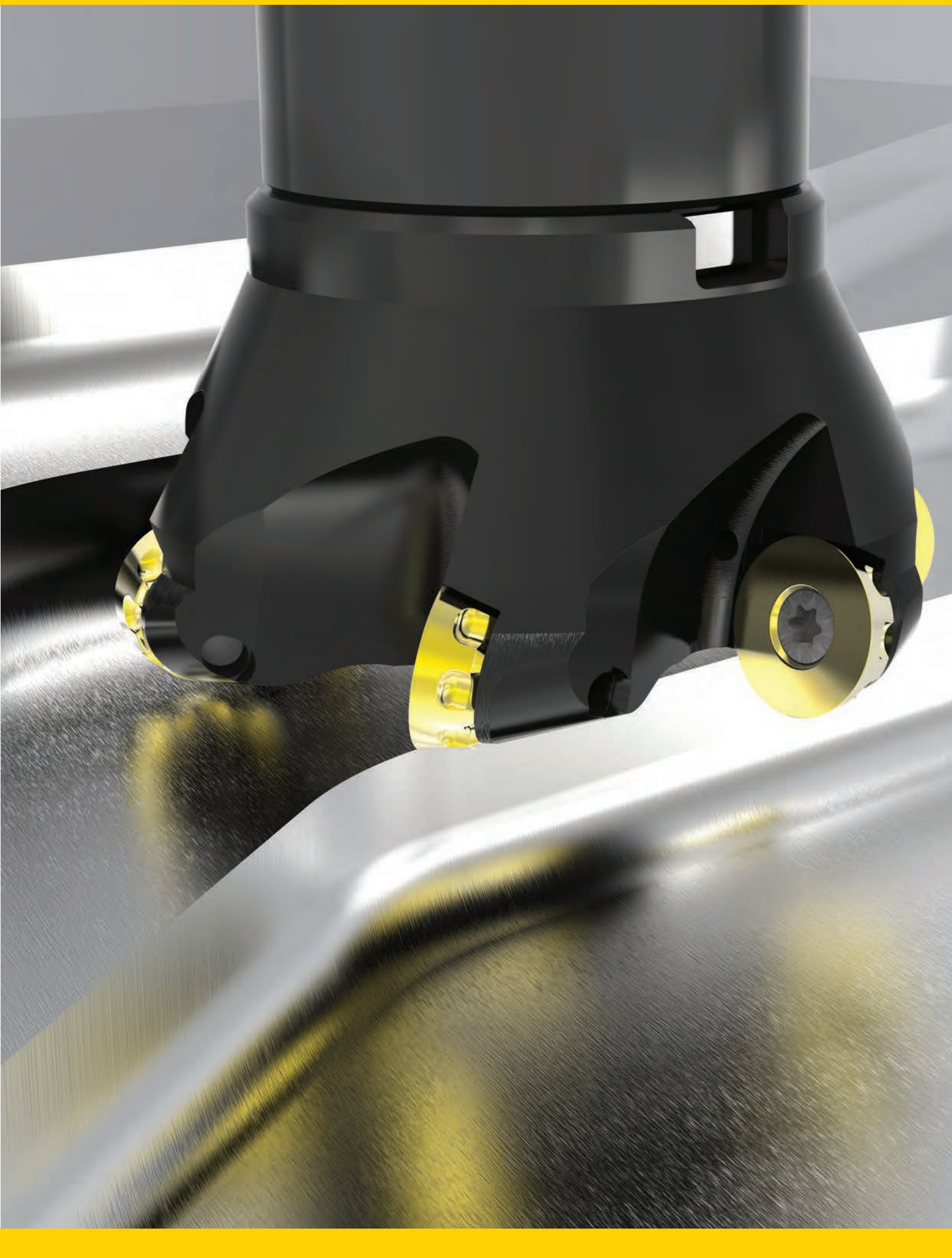
Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

With round inserts, the thickness of the chip varies depending on the axial depth of cut (a_p) and is related to the size of the cutting edge-preparation.
For best tool life it is important to maintain the proper chip thickness as shown below.

7700VR08 Inserts RP..0803..

Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
F-701	8,00	0,25	0,02	0,05	0,11	0,28
	8,00	0,50	0,02	0,05	0,08	0,20
	8,00	0,75	0,02	0,05	0,07	0,16
	8,00	1,00	0,02	0,05	0,06	0,14
	8,00	1,25	0,02	0,05	0,05	0,13
	8,00	1,50	0,02	0,05	0,05	0,12
E-701	8,00	0,25	0,02	0,05	0,11	0,28
	8,00	0,50	0,02	0,05	0,08	0,20
	8,00	0,75	0,02	0,05	0,07	0,16
	8,00	1,00	0,02	0,05	0,06	0,14
	8,00	1,25	0,02	0,05	0,05	0,13
	8,00	1,50	0,02	0,05	0,05	0,12
E-41	8,00	0,25	0,03	0,06	0,17	0,34
	8,00	0,50	0,03	0,06	0,12	0,24
	8,00	0,75	0,03	0,06	0,10	0,20
	8,00	1,00	0,03	0,06	0,08	0,17
	8,00	1,25	0,03	0,06	0,08	0,15
	8,00	1,50	0,03	0,06	0,07	0,14
E-422	8,00	0,25	0,03	0,07	0,17	0,40
	8,00	0,50	0,03	0,07	0,12	0,28
	8,00	0,75	0,03	0,07	0,10	0,23
	8,00	1,00	0,03	0,07	0,08	0,20
	8,00	1,25	0,03	0,07	0,08	0,18
	8,00	1,50	0,03	0,07	0,07	0,16



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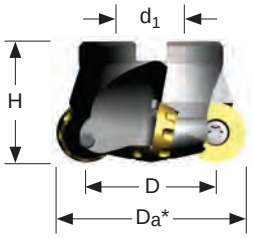


Shell Mill Fixation

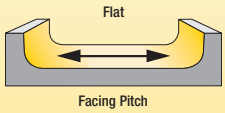
Product		Dimensions (mm)							Spares				
EDP	Item Description	D_a*	D Effective Cutting Diameter	H	l1	d1	ap max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7710VRD20 Shell Mill Fixation													
031443	7710VRD20-A063Z4R	63	43	40	40	22	10	4	*029640*	D6014T	*015241*	T20	10,50
031444	7710VRD20-A080Z5R	80	60	50	50	27	10	5					
031445	7710VRD20-A100Z6R	100	80	50	50	32	10	6					
031446	7710VRD20-A125Z7R	125	105	63	63	40	10	7					
031447	7710VRD20-160Z08R	160	140	63	63	40	10	8					

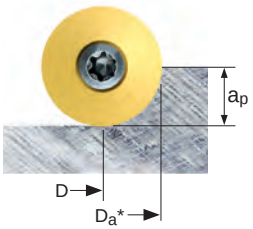
D = Effective Diameter (Axis) from Insert centreline to centreline

D_a* = Outside Diameter

7710VRD20 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		ap max Helical / Linear	Max RPM
031443	7710VRD20-A063Z4R	43	8.30	88	124	6,60	14850
031444	7710VRD20-A080Z5R	60	5.40	122	158	6,60	18500
031445	7710VRD20-A100Z6R	80	3.80	162	198	6,60	16000
031446	7710VRD20-A125Z7R	105	2.80	212	248	6,60	14000
031447	7710VRD20-160Z08R	140	2.20	282	318	6,60	12100





Depth of Cut (a_p)

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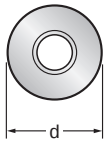
RDHT20-42-X8

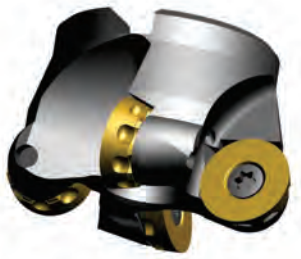

RDHW20-E-X8


RDHW20-S-X8


RDHW20-25-X8



Product			Application & Material			Dimensions (mm)				
EDP	Item Description	Grade	Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼	d (IC)	l	s	r	h_m min
			Depth of Cut (mm)							
			a_p max 10,0*	a_p min. - max. 1,0 - 3,0	a_p min. - max. 0,2 - 1,0					
029310	RDHT2006M0E-42-X8	X500	◆■●	◆■●	-	20,00	-	6,35	10,00	0,08
031533	RDHT2006M0E-42-X8	SP6519	◆■●	◆■●	-	20,00	-	6,35	10,00	0,08
029309	RDHW2006M0E-X8	X500	-	●●●●◆	-	20,00	-	6,35	10,00	0,10
031661	RDHW2006M0S-X8	X500	●●◆	■■■	-	20.00	-	6.35	10.00	0,15
031662	RDHW2006M0S-X8	SP6519	■■■	◆◆◆	-	20.00	-	6.35	10.00	0,15
031660	RDHW2006M0S-25-X8	X500	●●●	-	-	20,00	-	6,35	10,00	0,25
031576	RDHW2006M0S-25-X8	SP6519	◆◆◆	-	-	20,00	-	6,35	10,00	0,25



Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 46.

* Max. recommended a_p = 7,5mm (depending on the application)

INSERT APPLICATION NOTES:

RDHW2006MOE-X8 X500 should be your first choice for medium roughing application when machining Titanium without heavy scale.
RDHW2006M0S-X8 SP6519 should be used when machining Stainless Steel with heavy scale.
RDHW2006M0S-X8 X500 should be used when machining High Temperature Alloys with heavy scale.
RDHT2006M0E-42-X8 should be used when the machine tool has low power available and when the conditions are stable.
RDHW2006M0S-25-X8 should be used for heavy duty applications.

7710VRD20 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
E-42-X8	X500	Facing	-	-	0,15 - 0,35	0,15 - 0,30	-	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,25	0,12 - 0,30	-	-
E-42-X8	SP6519	Facing	-	-	0,15 - 0,35	0,15 - 0,28	-	-	-	-	-	0,12 - 0,25	0,12 - 0,25	0,12 - 0,25	0,12 - 0,30	-	-
E-X8	X500	Facing	0,20 - 0,30	0,18 - 0,28	0,20 - 0,40	0,20 - 0,30	0,20 - 0,35	0,20 - 0,35	0,20 - 0,30	-	-	0,20 - 0,28	0,20 - 0,28	0,20 - 0,28	0,20 - 0,32	-	-
S-X8	X500	Facing	0,25 - 0,45	0,25 - 0,35	0,25 - 0,45	0,25 - 0,32	0,25 - 0,45	0,25 - 0,45	0,25 - 0,40	-	-	0,25 - 0,32	0,25 - 0,32	0,25 - 0,32	0,25 - 0,35	-	-
S-X8	SP6519	Facing	0,25 - 0,45	0,25 - 0,35	-	-	0,25 - 0,45	0,25 - 0,45	0,25 - 0,40	-	-	-	-	-	-	-	-
S-25-X8	X500	Facing	0,35 - 0,60	0,35 - 0,50	-	-	0,35 - 0,60	0,35 - 0,55	0,35 - 0,45	-	-	-	-	-	-	-	-
S-25-X8	SP6519	Facing	0,35 - 0,55	0,35 - 0,45	-	-	0,35 - 0,55	0,35 - 0,50	0,35 - 0,40	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

Note: Speed recommendations can be found on page 32.

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Speed v_c (m/min)

7710VRD20 Series			Wear Resistance – +				
			Speed min. - max.				
Coolant Recommendation Recommended ● Possible ⦿					CVD X Grade		PVD Standard
ISO	**Materials**	**Rm and Hardness**	💧	🚫	X500	💧	🚫	SP6519
P	Unalloyed Steel	<600 N/mm² <180 HBN	⦿	●	130 - 270	⦿	●	130 - 295
		<950 N/mm² <280 HBN			115 - 240			115 - 260
	Alloyed Steel	700-950 N/mm² 200-280 HBN	⦿	●	100 - 210	⦿	●	100 - 230
		950-1200 N/mm² 280-355 HBN			75 - 160			75 - 175
		1200-1400 N/mm² 355-415 HBN		●	50 - 100		●	50 - 110
M	Stainless Steel	Austenitic + Ferritic 300 series	⦿	●	115 - 250	⦿	●	115 - 270
		Martensitic 400 series			100 - 220			105 - 235
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 120
K	Cast Iron	Grey GG-Ft	⦿	●	120 - 280	⦿	●	140 - 295
		Spheroidal-Ductile GGG-FGS			105 - 205			110 - 240
		Malleable GTS - MN/MP			95 - 170			100 - 220
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN						
		Aluminium + Silicon > 16% Si 92 HBN						
S	High Temperature Alloys	Iron Based	●		23 - 48	●		23 - 55
		Cobalt Based			21 - 44			22 - 48
		Nickel Based			24 - 51			25 - 55
		Titanium Based			35 - 73			36 - 79
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN						
		Chilled Cast Iron >1400 N/mm² > 400 HBN						

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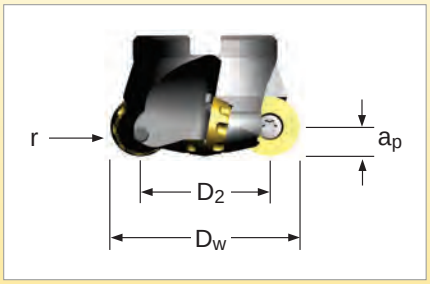
7710VRD20 Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where:

D_w = Working Diameter
D_2 = Diameter of cutter insert centre to centre
r = Insert radius
a_p = Axial Depth of Cut

7710VRD20 Technical Information

where:

f_z = Feed per tooth
h_m = Average chip thickness
r = Insert radius
a_e = Radial Depth of Cut
a_p = Axial Depth of Cut

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

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Simplified formulas to evaluate h_m and f_z based on axial depth of cut (a_p) or radial engagement (a_e).

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

h_m = Average chip thickness
a_p = Depth of cut
f_z = Feed per tooth
d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
a_e = Radial engagement
f_z = Feed per tooth
d = Cutter diameter

Formula: Average Chip Thickness (h_m)

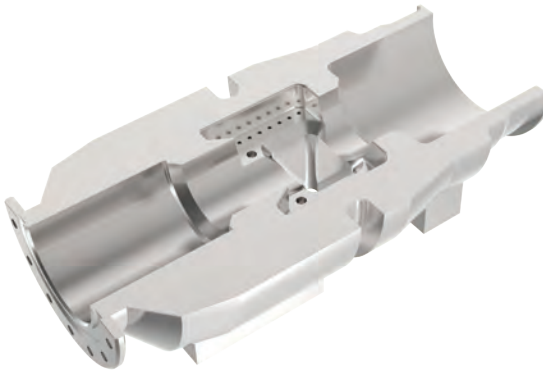
$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

With round inserts, the thickness of the chip varies depending on the axial depth of cut (a_p) and is related to the size of the cutting edge-preparation. For best tool life it is important to maintain the proper chip thickness as shown below. This chart calculates in relation with axial depth of cut (a_p) only and not radial cut (a_e).

RD..2006..insert

Insert	Insert size (mm)	a_p d.o.c. (mm)	h_m (mm)		f_z (mm/Z)	
			min.	max.	min.	max.
RDHT2006M0E-42-X8	20,00	1,00	0,08	0,18	0,36	0,80
	20,00	2,00	0,08	0,18	0,25	0,57
	20,00	3,00	0,08	0,18	0,21	0,46
	20,00	4,00	0,08	0,18	0,18	0,40
	20,00	5,00	0,08	0,18	0,16	0,36
	20,00	6,00	0,08	0,18	0,15	0,33
	20,00	8,00	0,08	0,18	0,13	0,28
	20,00	10,00	0,08	0,18	0,11	0,25
RDHW2006M0E-X8	20,00	1,00	0,10	0,20	0,45	0,89
	20,00	2,00	0,10	0,20	0,32	0,63
	20,00	3,00	0,10	0,20	0,26	0,52
	20,00	4,00	0,10	0,20	0,22	0,45
	20,00	5,00	0,10	0,20	0,20	0,40
	20,00	6,00	0,10	0,20	0,18	0,37
	20,00	8,00	0,10	0,20	0,16	0,32
	20,00	10,00	0,10	0,20	0,14	0,28
RDHW2006M0S-X8	20,00	2,00	0,15	0,25	0,47	0,79
	20,00	3,00	0,15	0,25	0,39	0,65
	20,00	4,00	0,15	0,25	0,34	0,56
	20,00	5,00	0,15	0,25	0,30	0,50
	20,00	6,00	0,15	0,25	0,27	0,46
	20,00	8,00	0,15	0,25	0,24	0,40
	20,00	10,00	0,15	0,25	0,21	0,35
RDHW2006M0S-25-X8	20,00	4,00	0,25	0,30	0,56	0,67
	20,00	5,00	0,25	0,30	0,50	0,60
	20,00	6,00	0,25	0,30	0,46	0,55
	20,00	8,00	0,25	0,30	0,40	0,47
	20,00	10,00	0,25	0,30	0,35	0,42

77 Family Case Histories



7710 Case History

Material: 600 Series High Temperature Alloy
Cutter: 7710VRD20 (100mm Cutter)
Component: Heat Exchanger Pump Housing
Industry: Power Generation - Nuclear
Insert Grade: X500
RPM: 105
Cutting Speed V_C: 33,5 m/min
Feed per Tooth f_Z: 0,323mm
Feed Rate: 203 mm/min
Depth of Cut a_p: 6,35mm

60% Reduction in Cycle Time

- 150% Productivity Increase
- 60% Reduction in Tooling Costs
- Zero Failures
- Zero Defects
- Finishing Operation Eliminated

7713 Case History

Material: Stainless Steel 300 Series
Cutter: 7713VR12 (63mm Cutter)
Component: Turbine Blade
Industry: Power Generation
Insert Grade: SP6519
RPM: 909
Cutting Speed V_C: 180 m/min
Feed per Tooth f_Z: 0,3mm
Feed Rate: 1,636 m/min
Depth of Cut a_p: 2,2mm

80% Increase in Tool Life!

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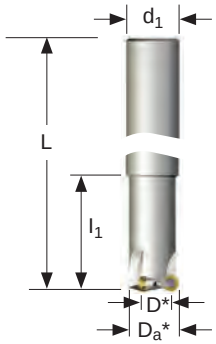
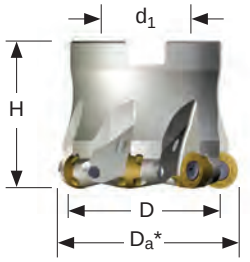
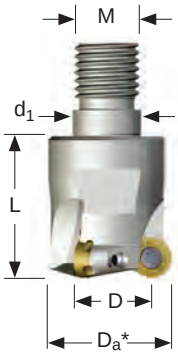


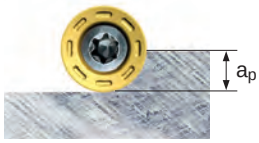
Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (ap)

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L/H	l_1	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7713VR10 Cylindrical Shank - Medium and Fine Pitch													
033100	7713VR10CA020Z2R40	20	10	180	40	20	5	2	*031233*	D4007T	*031654*	TB15	3,10
033101	7713VR10CA025Z3R50	25	15	200	50	25	5	3	*031233*	D4007T	*031654*	TB15	3,10
033102	7713VR10CA032Z3R70	32	22	250	70	32	5	3	*015260*	D4008T	*031654*	TB15	3,10
033103	7713VR10CA032Z4R70	32	22	250	70	32	5	4	*015260*	D4008T	*031654*	TB15	3,10
7713VR10 Shell Mill Fixation - Medium and Fine Pitch													
033104	7713VR10-A040Z05R	40	30	40	-	16	5	5	*015260*	D4008T	*031654*	TB15	3,10
033105	7713VR10-A042Z06R	42	32	40	-	16	5	6	*018481*	D4006T	*031654*	TB15	3,10
033106	7713VR10-A050Z06R	50	40	40	-	22	5	6	*015260*	D4008T	*031654*	TB15	3,10
033107	7713VR10-A050Z07R	50	40	40	-	22	5	7	*015260*	D4008T	*031654*	TB15	3,10
033108	7713VR10-A063Z08R	63	53	40	-	22	5	8	*015260*	D4008T	*031654*	TB15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

D_a* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L	M	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
7713VR10 Modular Head - Medium and Fine Pitch													
033109	7713VR10SA020Z2R25	20	10	25	M10	10.5	5	2	*031233*	D4007T	*031654*	TB15	3,10
033110	7713VR10SA025Z2R35	25	15	35	M12	12.5	5	2	*031233*	D4007T	*031654*	TB15	3,10
033111	7713VR10SA025Z3R35	25	15	35	M12	12.5	5	3	*031233*	D4007T	*031654*	TB15	3,10
033112	7713VR10SA032Z3R35	32	22	35	M16	17.0	5	3	*015260*	D4008T	*031654*	TB15	3,10
033113	7713VR10SA032Z4R35	32	22	35	M16	17.0	5	4	*015260*	D4008T	*031654*	TB15	3,10
033114	7713VR10SA035Z5R35	35	25	35	M16	17.00	5	5	*031233*	D4007T	*031654*	TB15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

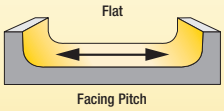
D_a* = Outside Diameter

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 45.
The 7713VR10 series with anti-rotation pocket ensures a precise number of indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket during heavy feed machining and unstable conditions.

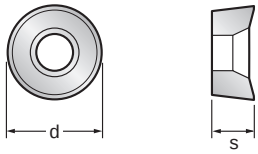
7713VR10 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
033100	7713VR10CA020Z2R40	10	1.89	22	38	3,33	64500
033101	7713VR10CA025Z3R50	15	5.22	32	48	3,33	53500
033102	7713VR10CA032Z3R70	22	8.64	46	62	3,33	53500
033103	7713VR10CA032Z4R70	22	8.64	46	62	3,33	53500
033104	7713VR10-A040Z05R	30	7.28	62	78	3,33	47000
033105	7713VR10-A042Z06R	32	6.71	66	82	3,33	39500
033106	7713VR10-A050Z06R	40	5.22	82	98	3,33	39500
033107	7713VR10-A050Z07R	40	5.31	82	98	3,33	39500
033108	7713VR10-A063Z08R	53	3.79	108	124	3,33	34000
033109	7713VR10SA020Z2R25	10	1.89	22	38	3,33	64000
033110	7713VR10SA025Z2R35	15	5.22	32	48	3,33	64000
033111	7713VR10SA025Z3R35	15	5.22	32	48	3,33	64000
033112	7713VR10SA032Z3R35	22	8.64	46	62	3,33	64000
033113	7713VR10SA032Z4R35	22	8.64	46	62	3,33	53500
033114	7713VR10SA035Z5R35	25	7.20	52	68	3,33	53500



STELLRAM

RPEX10-701 RPHT10-421 RPMT10-41 RPHT10-422 RPHT10-T RPMW10-T



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			ap max 5,00*	ap min. - max. 1,00 - 2,0	ap min. - max. 0,20 - 1,00					
034546	RPEX10T3M0F-701-X4	SP4019	■	■	■♦	10,00	-	3,97	5,00	0,02
030456	RPEX10T3M0F-701-X4	GH1	♦	♦	♦	10,00	-	3,97	5,00	0,02
034545	RPEX10T3M0E-701-X4	SP6519	-	-	■	10,00	-	3,97	5,00	0,02
030449	RPHT10T3M0E-421-X4	X500	-	●	-	10,00	-	3,97	5,00	0,04
030410	RPHT10T3M0E-421-X4	X700	-	-	●	10,00	-	3,97	5,00	0,04
030452	RPMT10T3M0E-41-X4	X500	-	●	-	10,00	-	3,97	5,00	0,04
031539	RPMT10T3M0E-41-X4	SP6519	-	-	■■●●	10,00	-	3,97	5,00	0,04
030451	RPMT10T3M0E-41-X4	MP91M	-	■	●♦	10,00	-	3,97	5,00	0,04
030697	RPHT10T3M0E422-X4	X500	■♦	■♦	○	10,00	-	3,97	5,00	0,03
030767	RPHT10T3M0E-422-X4	X700	●○●	○	♦	10,00	-	3,97	5,00	0,03
030862	RPHT10T3M0E-422-X4	SP6519	●●♦□●■	●●♦□●■	♦■□■	10,00	-	3,97	5,00	0,03
030329	RPHT10T3M0T-X4	X500	■■	■■	-	10,00	-	3,97	5,00	0,08
031555	RPHT10T3M0T-X4	SP6519	♦♦♦	♦♦♦	-	10,00	-	3,97	5,00	0,08
030454	RPMW10T3M0T-X4	X500	♦♦♦♦♦	♦♦♦♦♦	-	10,00	-	3,97	5,00	0,13

Machining Choice: ♦ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 46.

RPMW10T3MOT-X4 X500 is recommended for materials with heavy scale.

*Max. recommended ap = 2,5mm (depending on the application)

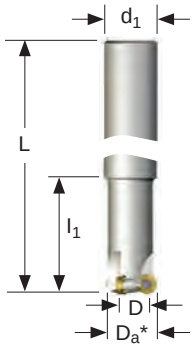
7713VR10 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701-X4	SP4019	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,08	0,02 - 0,07	0,02 - 0,07	0,03 - 0,08	0,03 - 0,09	-	-
F-701-X4	GH1	Contouring	-	-	-	-	-	-	-	0,02 - 0,10	0,02 - 0,08	-	-	-	-	-	-
E-701-X4	SP6519	Contouring	-	-	-	-	-	-	-	-	-	0,02 - 0,07	0,02 - 0,07	0,03 - 0,08	0,03 - 0,09	-	-
E-421-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,09	0,04 - 0,11	-	-
E-421-X4	X700	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,09	0,04 - 0,11	-	-
E-41-X4	X500	Contouring	-	-	0,04 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-
E-41-X4	SP6519	Contouring	0,04 - 0,18	0,04 - 0,16	0,04 - 0,18	-	0,04 - 0,18	0,04 - 0,18	0,04 - 0,16	-	-	-	-	-	-	-	-
E-41-X4	MP91M	Contouring	0,04 - 0,18	0,04 - 0,16	-	-	0,04 - 0,16	0,04 - 0,16	0,04 - 0,14	-	-	-	-	-	-	-	-
E-422-X4	X500	Contouring	-	-	0,06 - 0,30	0,06 - 0,25	-	-	-	-	-	0,06 - 0,14	0,06 - 0,14	0,06 - 0,16	0,06 - 0,18	-	-
E-422-X4	X700	Contouring	-	-	0,06 - 0,28	0,06 - 0,22	-	-	-	-	-	0,06 - 0,12	0,06 - 0,12	0,06 - 0,14	0,06 - 0,16	-	-
E-422-X4	SP6519	Contouring	0,06 - 0,30	0,06 - 0,25	0,06 - 0,28	0,03 - 0,22	0,06 - 0,25	0,06 - 0,25	0,06 - 0,22	-	-	0,06 - 0,12	0,06 - 0,12	0,06 - 0,14	0,06 - 0,16	-	-
T-X4	X500	Contouring	0,08 - 0,33	0,08 - 0,28	-	-	-	-	-	-	-	-	-	-	-	-	-
T-X4	SP6519	Contouring	0,08 - 0,32	0,08 - 0,27	-	-	0,08 - 0,30	0,08 - 0,30	0,08 - 0,28	-	-	-	-	-	-	-	-
T-X4	X500	Contouring	0,13 - 0,35	0,13 - 0,33	0,13 - 0,35	0,13 - 0,30	-	-	-	-	-	0,13- 0,18	0,13 - 0,18	0,13 - 0,20	0,13 - 0,22	-	-

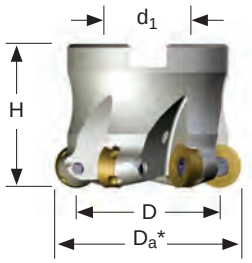
Note: HTA = High Temperature Alloys

Speed recommendations can be found on page 41.

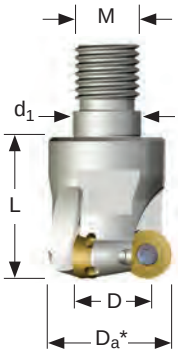
STELLRAM



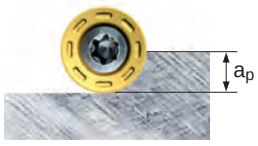
Cylindrical Shank



Shell Mill Fixation



Modular Head



Depth of Cut (a_p)

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L/H	l_1	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
	7713VR12 Cylindrcal Shank												
033126	7713VR12CA025Z2R50	25	13	200	50	25	6	2	*015260*	D4008T	*015240*	T15	3,10
033127	7713VR12CA032Z3R70	32	20	250	70	32	6	3	*015260*	D4008T	*015240*	T15	3,10
	7713VR12 Shell Mill Fixation - Medium and Fine Pitch												
033115	7713VR12-A040Z04R	40	28	40	-	16	6	4	*015262*	D4010T	*015240*	T15	3,10
033116	7713VR12-A040Z05R	40	28	40	-	16	6	5	*015262*	D4010T	*015240*	T15	3,10
033117	7713VR12-A050Z05R	50	38	40	-	22	6	5	*015262*	D4010T	*015240*	T15	3,10
033118	7713VR12-A050Z06R	50	38	40	-	22	6	6	*015262*	D4010T	*015240*	T15	3,10
033119	7713VR12-A052Z05R	52	40	40	-	22	6	5	*015262*	D4010T	*015240*	T15	3,10
033120	7713VR12-A052Z06R	52	40	40	-	22	6	6	*015262*	D4010T	*015240*	T15	3,10
033121	7713VR12-A063Z06R	63	51	50	-	22	6	6	*015262*	D4010T	*015240*	T15	3,10
033122	7713VR12-A063Z07R	63	51	50	-	22	6	7	*015262*	D4010T	*015240*	T15	3,10
033123	7713VR12-A066Z06R	66	54	50	-	27	6	6	*015262*	D4010T	*015240*	T15	3,10
033124	7713VR12-A066Z07R	66	54	50	-	27	6	7	*015262*	D4010T	*015240*	T15	3,10
033125	7713VR12-A080Z08R	80	68	50	-	27	6	8	*015262*	D4010T	*015240*	T15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

Da* = Outside Diameter

Product		Dimensions (mm)							Spares				
EDP	Item Description	Da*	D Effective Diameter	L	M	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
	7713VR12 Modular Head - Medium and Fine Pitch												
033128	7713VR12SA025Z2R35	25	13	35	M12	12,50	6	2	*015260*	D4008T	*015240*	T15	3,10
033129	7713VR12SA032Z3R35	32	20	35	M16	17,00	6	3	*015260*	D4008T	*015240*	T15	3,10
033130	7713VR12SA040Z4R43	40	28	43	M16	17,00	6	4	*015260*	D4008T	*015240*	T15	3,10
033131	7713VR12SA040Z5R43	40	28	43	M16	17,00	6	5	*015260*	D4008T	*015240*	T15	3,10

D = Effective Diameter (Axis) from Insert centreline to centreline

Da* = Outside Diameter

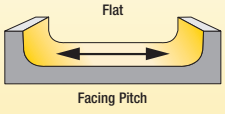
Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 45.

The 7713VR12 series with anti-rotation pocket ensures a precise number of indexes per insert.

This unique patented pocket design prevents the inserts from rotating in the pocket during heavy feed machining and unstable conditions.

7713VR12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
033126	7713VR12CA025Z2R50	13	11.20	28	48	4,00	50000
033127	7713VR12CA032Z3R70	20	10.80	42	62	4,00	40000
033115	7713VR12-A040Z04R	28	7.90	58	78	4,00	34000
033116	7713VR12-A040Z05R	28	7.90	58	78	4,00	34000
033117	7713VR12-A050Z05R	38	5.50	78	98	4,00	29000
033118	7713VR12-A050Z06R	38	5.50	78	98	4,00	29000
033119	7713VR12-A052Z05R	40	5.15	82	102	4,00	28500
033120	7713VR12-A052Z06R	40	5.15	82	102	4,00	28500
033121	7713VR12-A063Z06R	51	3.85	104	124	4,00	25000
033122	7713VR12-A063Z07R	51	3.85	104	124	4,00	25000
033123	7713VR12-A066Z06R	54	3.60	110	130	4,00	24500
033124	7713VR12-A066Z07R	54	3.60	110	130	4,00	24500
033125	7713VR12-A080Z08R	68	2.75	138	158	4,00	21500
033128	7713VR12SA025Z2R35	13	11.20	28	48	4,00	50000
033129	7713VR12SA032Z3R35	20	10.80	42	62	4,00	40000
033130	7713VR12SA040Z4R43	28	7.90	58	78	4,00	34000
033131	7713VR12SA040Z5R43	28	7.90	58	78	4,00	34000



STELLRAM


RPEX12-701

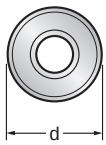

RPHT12-421

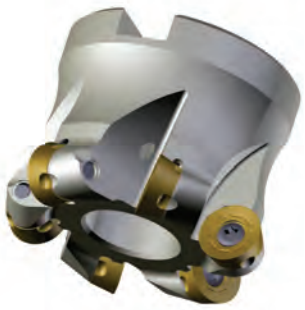

RPMT12-41


RPHT12-442


RPHT12-T


RPMW12-T





Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	hm min
			a_p max 6,00*	a_p min. - max. 1,00 - 2,50	a_p min. - max. 0,20 - 1,00					
029284	RPEX1204M0F-701-X4	GH1	◆	◆	◆	12,00		4,76	6,00	0,02
029282	RPEX1204M0E-701-X4	X500	-	-	●	12,00	-	4,76	6,00	0,03
029286	RPHT1204M0E-421-X4	X500	-	●	■	12,00	-	4,76	6,00	0,04
029700	RPHT1204M0E-421-X4	X700	-	-	◆◆	12,00	-	4,76	6,00	0,04
029272	RPMT1204M0E-41-X4	X500	●	●	-	12,00	-	4,76	6,00	0,05
031517	RPMT1204M0E-41-X4	SP6519	-	■●●	●●●	12,00	-	4,76	6,00	0,05
029291	RPMT1204M0E-41-X4	MP91M	-	■	●●■	12,00	-	4,76	6,00	0,05
032129	RPHT1204M0E-442-X4	X500	■◆◆	■◆◆	-	12,00	-	4,76	6,00	0,04
032130	RPHT1204M0E-442-X4	X700	●	●●	●●	12,00	-	4,76	6,00	0,04
032128	RPHT1204M0E-442-X4	SP6519	◆■■	◆◆■◆■	◆◆■■◆	12,00	-	4,76	6,00	0,04
029034	RPHT1204M0T-X4	X500	●	-	-	12,00	-	4,76	6,00	0,10
029699	RPHT1204M0T-X4	X700	●	-	-	12,00	-	4,76	6,00	0,10
031516	RPHT1204M0T-X4	SP6519	●■●	-	-	12,00	-	4,76	6,0	0,10
029295	RPMW1204M0T-X4	X500	◆◆◆	-	-	12,00	-	4,76	6,00	0,13
031518	RPMW1204M0T-X4	SP6519	■◆■	-	-	12,00	-	4,76	6,00	0,13
029294	RPMW1204M0T-X4	MP91M	◆◆	-	◆	12,00	-	4,76	6,00	0,13

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 46.

RPMW1204M0T-X4 should be used for materials with heavy scale

* Max. recommended a_p = 3,5mm (depending on the application)

Note: Feed recommendations can be found on page 40. Speed recommendations can be found on page 41.

STELLRAM

7713VR12 Feeds f_z (mm/tooth)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
F-701-X4	GH1	Contouring	-	-	-	-	-	-	-	0,03 - 0,12	0,03 - 0,10	-	-	-	-	-	-
E-701-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,03 - 0,08	0,03 - 0,08	0,03 - 0,10	0,03 - 0,11	-	-
E-421-X4	X500	Contouring	-	-	-	-	-	-	-	-	-	0,04 - 0,20	0,04 - 0,20	0,04 - 0,22	0,04 - 0,24	-	-
E-421-X4	X700	Contouring	-	-	0,05 - 0,25	0,04 - 0,12	-	-	-	-	-	0,04 - 0,20	0,04 - 0,20	0,04 - 0,21	0,04 - 0,23	-	-
E-41-X4	X500	Contouring	-	0,05 - 0,22	0,05 - 0,25	-	-	-	-	-	-	-	-	-	-	-	-
E-41-X4	SP6519	Contouring	0,05 - 0,25	0,05 - 0,22	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,20	-	-	-	-	-	-	-	-
E-41-X4	MP91M	Contouring	0,05 - 0,25	0,05 - 0,22	-	-	0,05 - 0,25	0,05 - 0,25	0,05 - 0,20	-	-	-	-	-	-	-	-
E-442-X4	X500	Contouring	-	-	0,06 - 0,40	0,06 - 0,33	-	-	-	-	-	0,06 - 0,24	0,06 - 0,24	0,06 - 0,24	0,06 - 0,26	-	-
E-442-X4	X700	Contouring	-	-	0,06 - 0,38	0,06 - 0,31	-	-	-	-	-	0,06 - 0,23	0,06 - 0,23	0,06 - 0,23	0,06 - 0,25	-	-
E-442-X4	SP6519	Contouring	0,06 - 0,45	0,06 - 0,38	0,06 - 0,38	0,06 - 0,31	0,06 - 0,40	0,06 - 0,40	0,06 - 0,35	-	-	0,06 - 0,23	0,06 - 0,23	0,06 - 0,23	0,06 - 0,25	-	-
RPHT-T-X4	X500	Contouring	-	0,15 - 0,40	-	-	-	-	-	-	-	-	-	-	-	-	-
RPHT-T-X4	X700	Contouring	-	-	-	0,15 - 0,35	-	-	-	-	-	-	-	-	-	-	-
RPHT-T-X4	SP6519	Contouring	0,15 - 0,45	0,15 - 0,40	-	-	0,15 - 0,45	0,15 - 0,45	0,15 - 0,40	-	-	-	-	-	-	-	-
RPMW-T-X4	X500	Contouring	-	-	0,13 - 0,35	0,13 - 0,30	-	-	-	-	-	0,13 - 0,25	0,13 - 0,25	0,13 - 0,27	0,13 - 0,29	-	-
RPMW-T-X4	SP6519	Contouring	0,13 - 0,45	0,13 - 0,40	-	-	0,13 - 0,45	0,13 - 0,45	0,13 - 0,40	-	-	-	-	-	-	-	-
RPMW-T-X4	MP91M	Contouring	0,13 -0,42	-	-	-	0,13 - 0,42	0,13 - 0,42	0,13 - 0,35	-	-	-	-	-	-	0,09 - 0,15	0,09 - 0,15

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page 41.

STELLRAM

Speed v_c (m/min)

7713VR Series

Wear Resistance: – ⟵ +

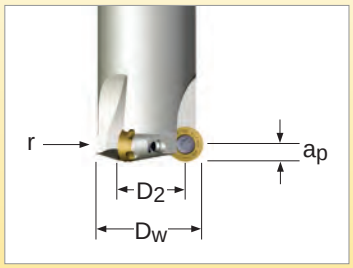
Speed min. - max.

Coolant Recommendation: Recommended ● Possible ⦿

ISO	Materials	Rm and Hardness			CVD X Grade			PVD X Grade			PVD Standard			PVD Standard			CVD Standard			Uncoated Micrograin
					X500			X700			SP6519			SP4019			MP91M			GH1
P	Unalloyed Steel	<600 N/mm² <180 HBN	⦿	●	130 - 270				⦿	●	130 - 295					●	140 - 345			
		<950 N/mm² <280 HBN			115 - 240						115 - 260						120 - 305			
	Alloyed Steel	700-950 N/mm² 200-280 HBN	⦿	●	100 - 210				⦿	●	100 - 230					●	105 - 270			
		950-1200 N/mm² 280-355 HBN			75 - 160						75 - 175						80 - 205			
		1200-1400 N/mm² 355-415 HBN		●	50 - 100					●	50 - 110					●	50 - 130			
M	Stainless Steel	Austenitic + Ferritic 300 series	⦿	●	115 - 250	⦿	●	115 - 260	⦿	●	115 - 270									
		Martensitic 400 series			100 - 220			105 - 230			105 - 235									
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 115	●		50 - 120									
K	Cast Iron	Grey GG-Ft									140 - 295					●	145 - 365			
		Spheroidal-Ductile GGG-FGS							⦿	●	110 - 240						115 - 285			
		Malleable GTS - MN/MP									100 - 220						105 - 260			
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN										●		400 - 2895				●		400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN												295 - 2320						295 - 2440
S	High Temperature Alloys	Iron Based	●		23 - 48	●		23 - 52	●		23 - 55	●		24 - 63						
		Cobalt Based			21 - 44			22 - 46			22 - 48			23 - 52						
		Nickel Based			24 - 51			25 - 53			25 - 55			26 - 59						
		Titanium Based			35 - 73			36 - 75			36 - 79			37 - 84						
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN														●	50 - 105			
		Chilled Cast Iron >1400 N/mm² > 400 HBN															40 - 95			

STELLRAM

7713VR Technical Information



Working Diameter:

Formula to evaluate the correct working diameter based on axial depth of cut (a_p).

$$D_w = D_2 + 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where:
- D_w = Working Diameter
- D_2 = Diameter of cutter insert centre to centre
- r = Insert radius
- a_p = Axial Depth of Cut

7713VR Technical Information

where:
- f_z = Feed per tooth
- h_m = Average chip thickness
- r = Insert radius
- a_e = Radial Depth of Cut
- a_p = Axial Depth of Cut

Formula to find programmed feed rate based on radial engagement and axial depth of cut.

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

Formula to calculate the average chip thickness h_m in relation with radial engagement and depth of cut.

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

Simplified formulas to evaluate h_m and f_z based on axial depth of cut or radial engagement.

Calculation of the average chip thickness in relation with the D.O.C. (Axial)

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_p}}$$

- h_m = Average chip thickness
- a_p = Depth of cut
- f_z = Feed per tooth
- d = Insert diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_p}{d}}$$

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

- h_m = Average chip thickness
- a_e = Radial engagement
- f_z = Feed per tooth
- d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

STELLRAM

With round inserts, the thickness of the chip varies depending on the axial depth of cut and is related to the size of the cutting edge preparation. For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RP..10T3..

Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
F-701-X4	10,00	0,25	0,02	0,08	0,13	0,51
	10,00	0,50	0,02	0,08	0,09	0,36
	10,00	0,75	0,02	0,08	0,07	0,29
	10,00	1,00	0,02	0,08	0,06	0,25
	10,00	1,25	0,02	0,08	0,06	0,23
	10,00	1,50	0,02	0,08	0,05	0,21
	10,00	2,00	0,02	0,08	0,04	0,18
	10,00	2,50	0,02	0,08	0,04	0,16
E-701-X4	10,00	0,25	0,03	0,09	0,19	0,57
	10,00	0,50	0,03	0,09	0,13	0,40
	10,00	0,75	0,03	0,09	0,11	0,33
	10,00	1,00	0,03	0,09	0,09	0,28
	10,00	1,25	0,03	0,09	0,08	0,25
	10,00	1,50	0,03	0,09	0,08	0,23
	10,00	2,00	0,03	0,09	0,07	0,20
	10,00	2,50	0,03	0,09	0,06	0,18
E-421-X4	10,00	0,25	0,04	0,10	0,25	0,63
	10,00	0,50	0,04	0,10	0,18	0,45
	10,00	0,75	0,04	0,10	0,15	0,37
	10,00	1,00	0,04	0,10	0,13	0,32
	10,00	1,25	0,04	0,10	0,11	0,28
	10,00	1,50	0,04	0,10	0,10	0,26
	10,00	2,00	0,04	0,10	0,09	0,22
	10,00	2,50	0,04	0,10	0,08	0,20
E-41-X4	10,00	0,25	0,04	0,12	0,25	0,76
	10,00	0,50	0,04	0,12	0,18	0,54
	10,00	0,75	0,04	0,12	0,15	0,44
	10,00	1,00	0,04	0,12	0,13	0,38
	10,00	1,25	0,04	0,12	0,11	0,34
	10,00	1,50	0,04	0,12	0,10	0,31
	10,00	2,00	0,04	0,12	0,09	0,27
	10,00	2,50	0,04	0,12	0,08	0,24
E-422-X4	10,00	0,25	0,04	0,16	0,25	1,01
	10,00	0,50	0,04	0,16	0,18	0,72
	10,00	0,75	0,04	0,16	0,15	0,58
	10,00	1,00	0,04	0,16	0,13	0,51
	10,00	1,25	0,04	0,16	0,11	0,45
	10,00	1,50	0,04	0,16	0,10	0,41
	10,00	2,00	0,04	0,16	0,09	0,36
	10,00	2,50	0,04	0,16	0,08	0,32
RPHT-T-X4	10,00	0,25	0,08	0,18	0,51	1,14
	10,00	0,50	0,08	0,18	0,36	0,80
	10,00	0,75	0,08	0,18	0,29	0,66
	10,00	1,00	0,08	0,18	0,25	0,57
	10,00	1,25	0,08	0,18	0,23	0,51
	10,00	1,50	0,08	0,18	0,21	0,46
	10,00	2,00	0,08	0,18	0,18	0,40
	10,00	2,50	0,08	0,18	0,16	0,36
RPMW-T-X4	10,00	0,25	0,13	0,19	0,82	1,20
	10,00	0,50	0,13	0,19	0,58	0,85
	10,00	0,75	0,13	0,19	0,47	0,69
	10,00	1,00	0,13	0,19	0,41	0,60
	10,00	1,25	0,13	0,19	0,37	0,54
	10,00	1,50	0,13	0,19	0,34	0,49
	10,00	2,00	0,13	0,19	0,29	0,42
	10,00	2,50	0,13	0,19	0,26	0,38

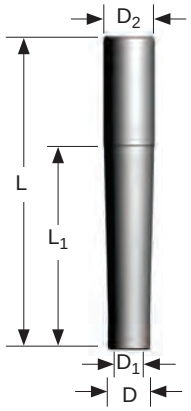
STELLRAM

With round inserts, the thickness of the chip varies depending on the axial depth of cut and is related to the size of the cutting edge preparation. For best tool-life it is important to maintain the proper chip thickness as shown below.

Inserts RP..1204..

Dimensions (mm)						
Inserts Geometry	Insert Size	a_p Axial d.o.c.	h_m min.	h_m max.	f_z min.	f_z max.
F-701-X4	12,00	0,25	0,02	0,11	0,14	0,76
	12,00	0,50	0,02	0,11	0,10	0,54
	12,00	1,00	0,02	0,11	0,07	0,38
	12,00	1,50	0,02	0,11	0,06	0,31
	12,00	2,00	0,02	0,11	0,05	0,27
	12,00	2,50	0,02	0,11	0,04	0,24
	12,00	3,00	0,02	0,11	0,04	0,22
	12,00	3,50	0,02	0,11	0,04	0,20
E-701-X4	12,00	0,25	0,03	0,12	0,21	0,83
	12,00	0,50	0,03	0,12	0,15	0,59
	12,00	1,00	0,03	0,12	0,10	0,42
	12,00	1,50	0,03	0,12	0,08	0,34
	12,00	2,00	0,03	0,12	0,07	0,29
	12,00	2,50	0,03	0,12	0,07	0,26
	12,00	3,00	0,03	0,12	0,06	0,24
	12,00	3,50	0,03	0,12	0,06	0,22
E-421-X4	12,00	0,25	0,04	0,14	0,28	0,97
	12,00	0,50	0,04	0,14	0,20	0,69
	12,00	1,00	0,04	0,14	0,14	0,48
	12,00	1,50	0,04	0,14	0,11	0,40
	12,00	2,00	0,04	0,14	0,10	0,34
	12,00	2,50	0,04	0,14	0,09	0,31
	12,00	3,00	0,04	0,14	0,08	0,28
	12,00	3,50	0,04	0,14	0,07	0,26
E-41-X4	12,00	0,25	0,05	0,16	0,35	1,11
	12,00	0,50	0,05	0,16	0,24	0,78
	12,00	1,00	0,05	0,16	0,00	0,55
	12,00	1,50	0,05	0,16	0,14	0,45
	12,00	2,00	0,05	0,16	0,12	0,39
	12,00	2,50	0,05	0,16	0,11	0,35
	12,00	3,00	0,05	0,16	0,10	0,32
	12,00	3,50	0,05	0,16	0,09	0,30
E-442-X4	12,00	0,25	0,06	0,20	0,42	1,39
	12,00	0,50	0,06	0,20	0,29	0,98
	12,00	1,00	0,06	0,20	0,21	0,69
	12,00	1,50	0,06	0,20	0,17	0,57
	12,00	2,00	0,06	0,20	0,15	0,49
	12,00	2,50	0,06	0,20	0,13	0,44
	12,00	3,00	0,06	0,20	0,12	0,40
	12,00	3,50	0,06	0,20	0,11	0,37
RPHT-T-X4	12,00	0,25	0,10	0,21	0,69	1,45
	12,00	0,50	0,10	0,21	0,49	1,03
	12,00	1,00	0,10	0,21	0,35	0,73
	12,00	1,50	0,10	0,21	0,28	0,59
	12,00	2,00	0,10	0,21	0,24	0,51
	12,00	2,50	0,10	0,21	0,22	0,46
	12,00	3,00	0,10	0,21	0,20	0,42
	12,00	3,50	0,10	0,21	0,19	0,39
RPMW-T-X4	12,00	0,25	0,13	0,22	0,90	1,52
	12,00	0,50	0,13	0,22	0,64	1,08
	12,00	1,00	0,13	0,22	0,45	0.76
	12,00	1,50	0,13	0,22	0,37	0.62
	12,00	2,00	0,13	0,22	0,32	0.54
	12,00	2,50	0,13	0,22	0,28	0.48
	12,00	3,00	0,13	0,22	0,26	0.44
	12,00	3,50	0,13	0,22	0,24	0.41

STELLRAM



Shank Extension

Product		Dimensions (mm)					
EDP	Item Description	L	L_1	D_2	D	D_1	M
030624	M-13-M8-CA16-090	90	40	16	13	8,50	M8
030625	M-13-M8-CA16-110	110	60	16	13	8,50	M8
030626	M-13-M8-CA16-130	130	80	16	13	8,50	M8
030627	M-13-M8-CA16-170	170	120	16	13	8,50	M8
030628	M-18-M10-CA20-110	110	60	20	18	10,50	M10
030629	M-18-M10-CA20-130	130	80	20	18	10,50	M10
030630	M-18-M10-CA20-170	170	120	20	18	10,50	M10
030631	M-18-M10-CA20-190	190	140	20	18	10,50	M10
030632	M-21-M12-CA25-131	131	75	25	21	12,50	M12
030633	M-21-M12-CA25-156	156	100	25	21	12,50	M12
030634	M-21-M12-CA25-181	181	125	25	21	12,50	M12
030635	M-21-M12-CA25-206	206	150	25	21	12,50	M12
030636	M-21-M12-CA25-231	231	175	25	21	12,50	M12
030637	M-29-M16-CA32-160	160	100	32	29	17,00	M16
030638	M-29-M16-CA32-210	210	150	32	29	17,00	M16
030639	M-29-M16-CA32-260	260	200	32	29	17,00	M16
030640	M-29-M16-CA32-310	310	250	32	29	17,00	M16

Note: Order example with cylindrical shank: M-13-M8-CA16-090

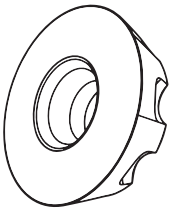
Cylindrical shank extensions can be used with all modular heads found in several product family series within this catalogue.

These extensions have the industry standard of metric threads.

Technical Advice

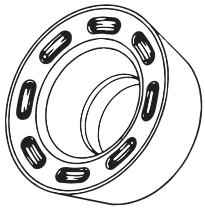
M	Modular adapter
13	Diameter in front of the modular shank (D)
M8	Metric Thread (M)
CA16	Cylindrical shank diameter 16mm with through coolant
90	Total length of the body

77 Family Geometries



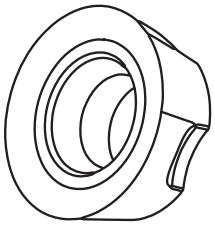
-25 P P K

This geometry is specifically designed for heavy roughing applications and is the first choice for Steels and Cast Iron.



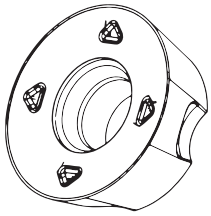
-422 P P M M K S

This positive geometry features an 11° chip angle and an “E” edge preparation for roughing and semi finishing applications in difficult to machine materials.



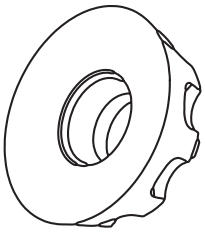
-41 K

This general purpose utility geometry has a positive cutting action and reinforced cutting edge for medium roughing and semi-finishing applications.



-442 P P M M K S

This NEW positive roughing and semi-finishing geometry features an 11° chip angle and an “E” edge preparation to minimize the pressure from chip formation.

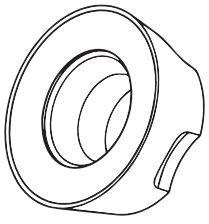


-42 M M

This general purpose roughing and semi-finishing geometry features a positive rake and T-land to create a strong cutting edge designed to withstand high cutting forces and interrupted cuts.

-701 M M N S

This precision ground extreme high positive geometry is especially suitable for finishing a wide range of materials at low feed rates and delivers excellent performance when machining thin-walled components.



-421 M M S

This high positive geometry features high accuracy periphery grinding for precise control of the cutting edge. For semi-finishing and finishing applications.

Tool	-25	-41	-42	-421	-422	-442	-701
7700VR08		●			●		●
7710VRD20	●		●				
7713VR10		●		●	●		●
7713VR12		●		●		●	●

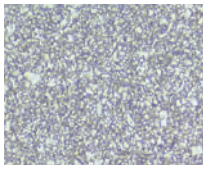
Material Guide – Key to Recommended Inserts

Material Designation							
P Unalloyed Steels	P Alloyed Steels	M Stainless Steels	M PH Stainless	K Cast Irons	N Aluminum & Alloys	S High Temp. Alloys	H Hard Materials

STELLRAM

77 Family Grades

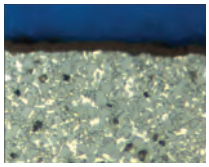
Tool	GH1	MP91M	SP4019	SP6519	X500	X700
7700VR08	●	●	●	●	●	
7710VRD20				●	●	
7713VR10	●	●	●	●	●	●
7713VR12	●	●		●	●	●



GH1 N

Uncoated, Micrograin

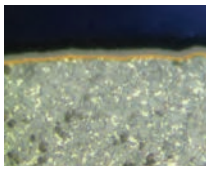
This micrograin grade works well with or without coolant with low cutting pressure at high speeds due to sharp cutting edge.



SP6519 P P M M K S

Coating Type: PVD, TiAlN

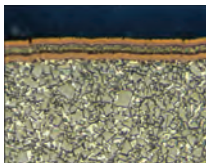
This grade features a combination of a tough substrate with a new generation of TiAlN super nano coating, making it virtually free of residual stress and extremely hard for unmatched performance.



MP91M K

Coating Type: CVD, TiN-MT-TiCN-Al2O3

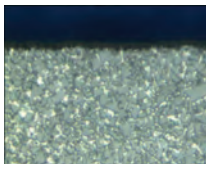
With its aluminium oxide coating, this grade is recommended every time wear characteristics are more important than toughness.



X500 P P M M S

Coating Type: CVD, TiN-TiC-TiN, X-Grade™ Technology

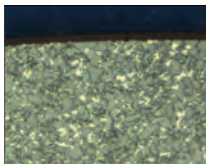
High level of shock resistance; operates at low to medium cutting speeds; high metal removal rates while retaining a secure cutting edge.



SP4019 S

Coating Type: PVD, TiAlN Micrograin

This hard grade is designed for light roughing and finishing operations with lower chip sections.



X700 M M S

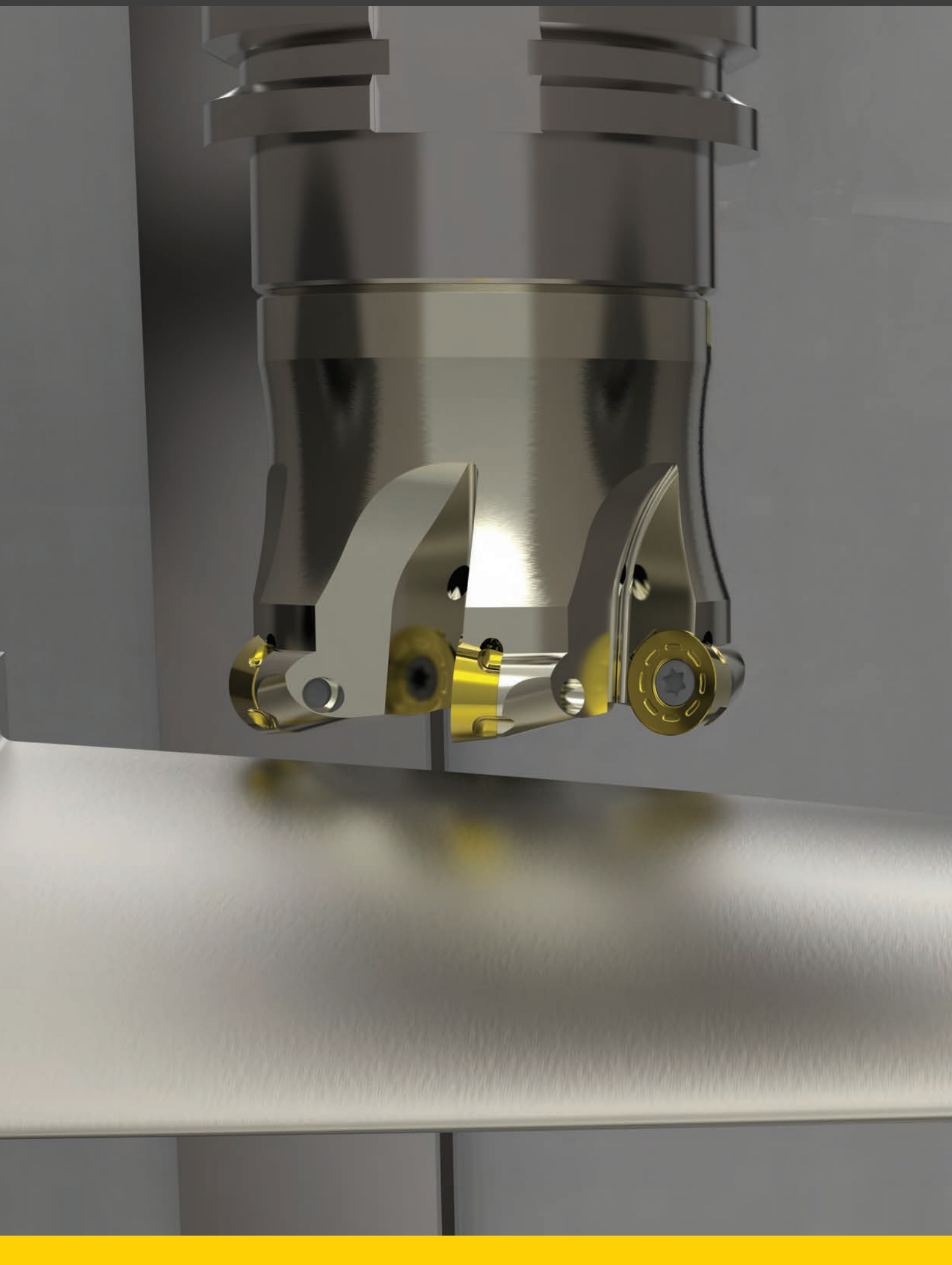
Coating Type: PVD, TiAlN, X-Grade™ Technology

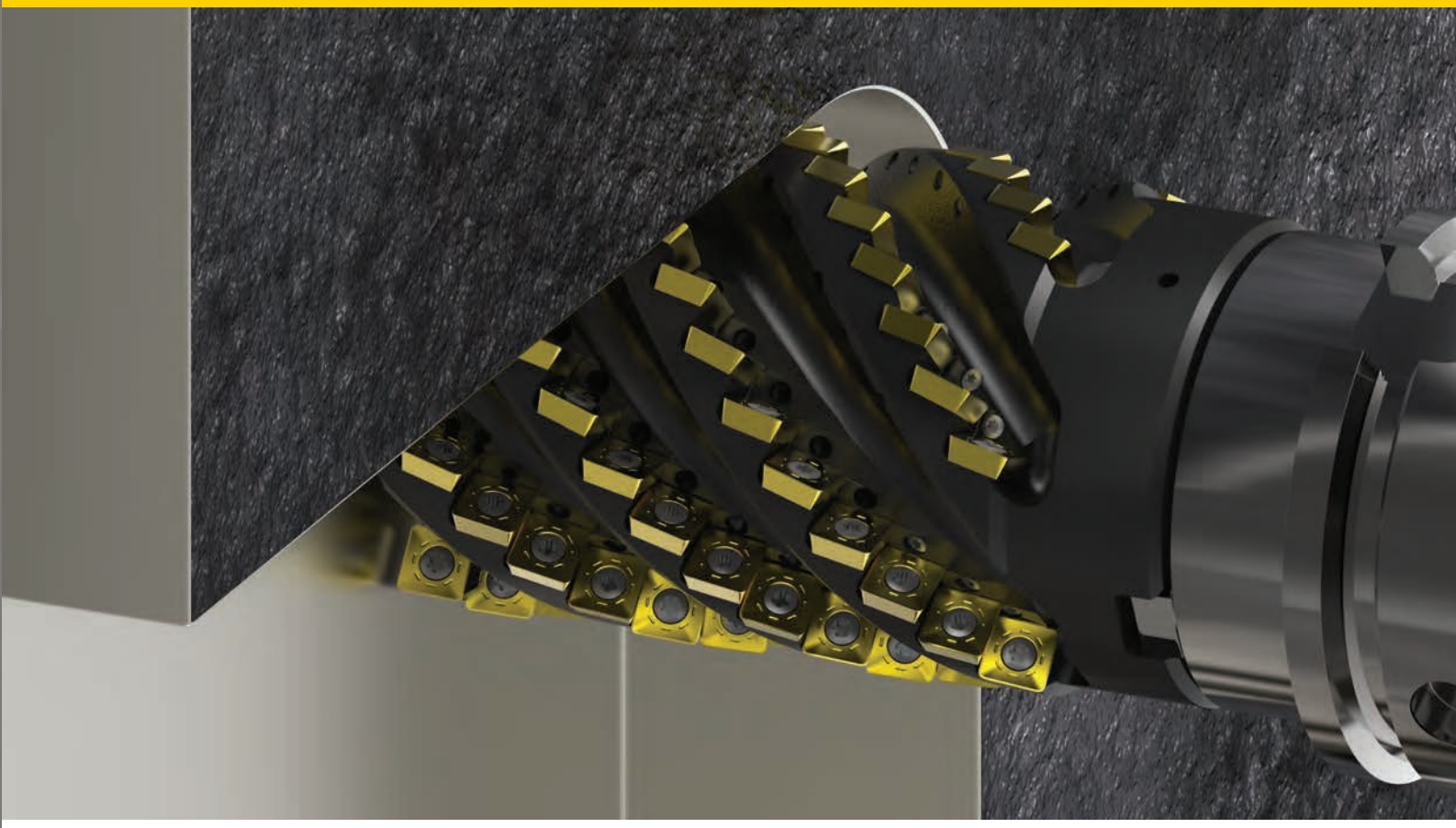
This combination of a highly durable TiAlN PVD coating and specially developed carbide substrate delivers excellent tool life during long contact times of the cutting edge.

Material Guide – Key to Recommended Inserts

Material Designation

P Unalloyed Steels | P Alloyed Steels | M Stainless Steels | M PH Stainless | K Cast Irons | N Aluminum & Alloys | S High Temp. Alloys | H Hard Materials





5230 Chevron Long Edge Milling

Setting New Standards of Productivity

- Unique insert alignment reduces cutting forces
- Each insert has its own coolant jet for maximum chip evacuation
- Continuous engagement for maximum material removal

The 5230VS Series: Cut Machining Time by up to 50% or More

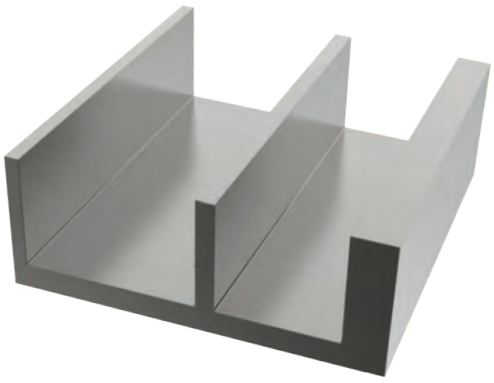
Shell
50mm – 100mm

- 90 degree roughing
- High Metal Removal Rates
- High Stability and Rigidity
- Square inserts, 4 cutting edges
- Three grades, four geometries
- Shell and Cylindrical construction
- Standard and long series available
- Cutting diameters from 50mm to 100mm
- Insert sizes 9,52mm and 12,70mm
- Depth of cut from 51mm to 133mm

5230 Case Histories

Material: Titanium 555-3
Cutter: 5230VS12 (63mm Cutter)
Component: Landing Gear
Industry: Aerospace
Insert Grade: X500
RPM: 150
Cutting Speed V_C: 29,7 m/min
Feed per Tooth f_Z: 0,1 mm/min
Feed Rate: 60 mm/min
Depth of Cut a_p: 50mm

Increased Metal Removal Rate by 300%!



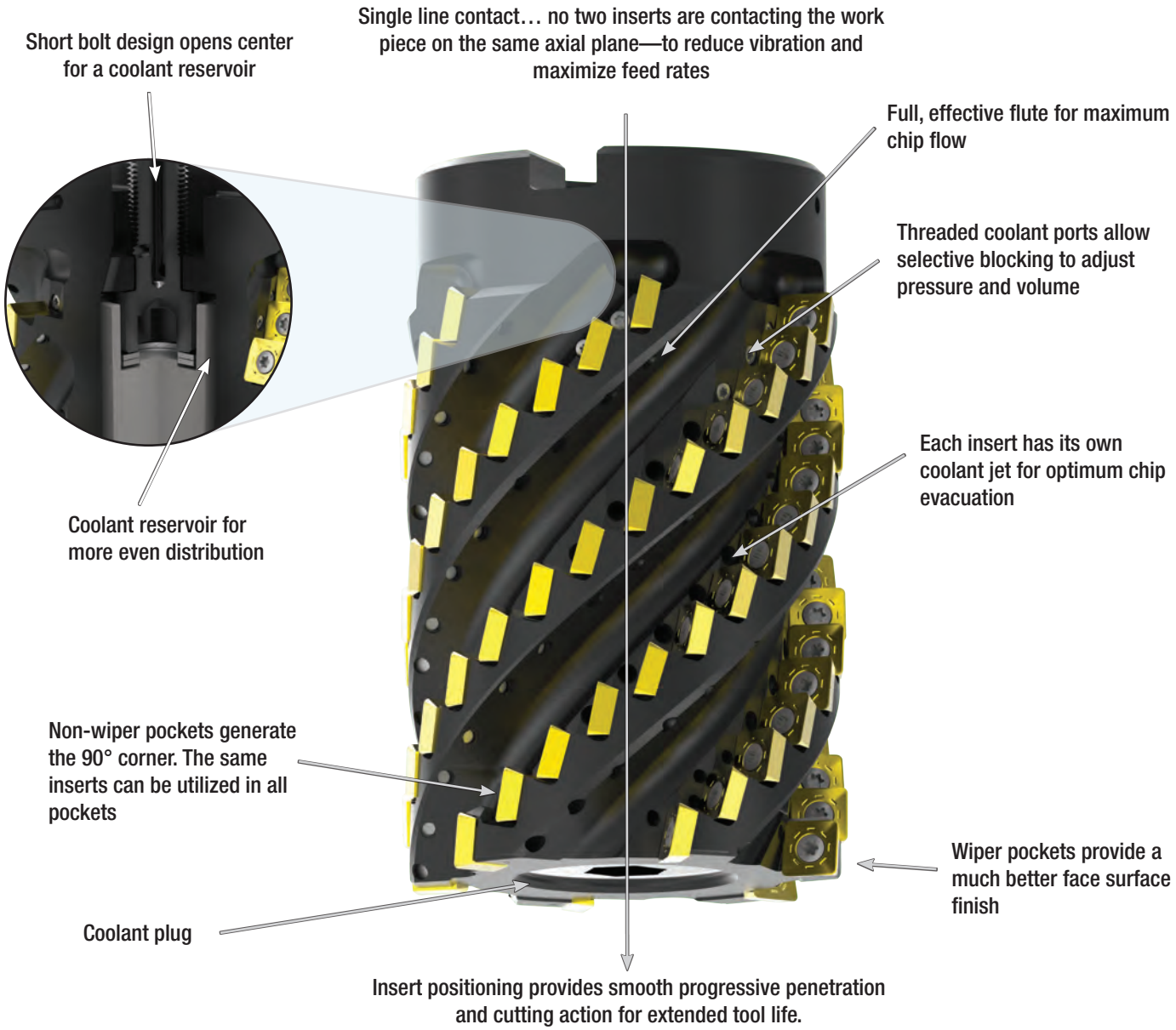
Material: Titanium 6-4
Cutter: 5230VS12 (80mm Cutter)
Component: Bulkhead
Industry: Aerospace
Insert Grade: X500
RPM: 275
Cutting Speed V_C: 69,0 m/min
Feed per Tooth f_Z: 0,1 mm/min
Feed Rate: 148 mm/min
Depth of Cut a_p: 60mm

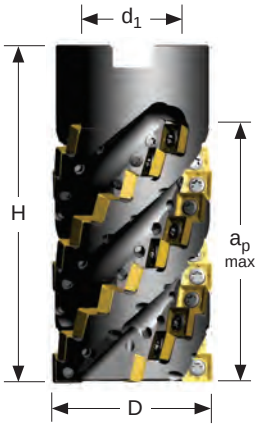
Incredible Metal Removal Rate of 43 in^3 / min.

Engineered from the Inside Out

Axial Engagement is the Key

The advanced Chevron Design ensures that one cutting point is always in contact with the material during entrance and exit. This provides optimum harmonic stability, reducing power consumption and maximizing tool life.





Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	a_p max Slotting*	No. of flutes	No. of inserts	*EDP*		*EDP*		Screw Tightening Nm
5230VS09 Shell Mill Fixation														
031419	5230VS09-A050Z4R51	50	76	-	27	51	44	4	28	*015269*	F3508T	*015240*	T15	2,10
031603	5230VS09-A050Z4R80	50	106	-	27	80	-	4	44	*015269*	F3508T	*015240*	T15	2,10

* Note: Please do not surpass the recommended max. a_p for slotting.

Shell Mills are supplied with inserts screws, coolant control screws, steel coolant plug, nord-lock washer and mounting screw.

5230VS09 Spare Parts

Cutter	Coolant Control Screw			*Screwdriver EDP*		Steel Coolant Plug		Coolant Plug tightening Nm
	Screw EDP	Screw	Qty.			*EDP*	Description	
5230VS09-A050Z4R51	*015062*	F3006T	8	*013214*	T9	*031436*	SB-3413	34
5230VS09-A050Z4R80			12			*031582*	SB-3621	

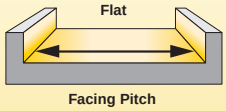
5230VS09 Torque Values and Spare Parts

Cutter	Nord Lock Washer		Mounting Bolt		**Torque Values in Nm	
	EDP	Description	*EDP*	Description	Normal Condition	Excessive Condition
5230VS09-A050Z4R51	*031258*	NLW-0.375	*031268*	M12-1.75 ISO x 30mm SHCS	80	100
5230VS09-A050Z4R80						

** Torque values for mounting bolts. Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

5230VS09 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
031419	5230VS09-A050Z4R51	50	-	-	-	-	32500
031603	5230VS09-A050Z4R80	50	-	-	-	-	32500



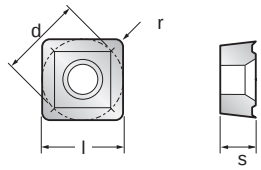
STELLRAM


SDHT09-422


SDHT09-423


SDMT09-41


SDMW09-TN



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max* or a_e max.*	a_p max. and a_e max. 15% D**	a_p min. - max.					
031261	SDHT09T308EN-422	X500	◆■	●○●	-	9,52	9,52	3,97	0,80	0,03
033075	SDHT09T308EN-422	SP6519	◆○	◆◆■	-	9,52	9,52	3,97	0,80	0,03
031260	SDHT09T308EN-423	X500	□◆	-	-	9,52	9,52	3,97	0,80	0,04
033074	SDHT09T308EN-423	SP6519	■●	■□◆	-	9,52	9,52	3,97	0,80	0,04
014410	SDMT09T308EN-41	X500	●	■■●	-	9,52	9,52	3,97	0,80	0,04
031479	SDMT09T308EN-41	SP6519	■■●	■	-	9,52	9,52	3,97	0,80	0,04
017325	SDMT09T308EN-41	MP91M	■	●●◆	-	9,52	9,52	3,97	0,80	0,04
015232	SDMW09T308TN	X500	●●	-	-	9,52	9,52	3,97	0,80	0,15
031482	SDMW09T308TN	SP6519	◆◆	-	-	9,52	9,52	3,97	0,80	0,15
017327	SDMW09T308TN	MP91M	◆	-	-	9,52	9,52	3,97	0,80	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 63.

* Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page 52.

* Note: a_p max. for profiling is only possible when a_e < 75% of the Diameter.

** Note: For semi finishing, axial engagement $\mathbf{a_p}$ for slotting and radial engagement $\mathbf{a_e}$ for profiling should be max. 15% of the Diameter. SDHT09T308EN-423 to be used in unstable conditions.

Note: Feed recommendations can be found on page 54. Speed recommendations can be found on page 55.

STELLRAM

5230VS09 Feeds f_z (mm/flute)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
EN-422	X500	Shoulder/ Profiling	-	-	0,05 - 0,13	0,05 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	0,04 - 0,11	0,04 - 0,10	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-422	SP6519	Shoulder/ Profiling	-	-	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	0,04 - 0,10	0,04 - 0,09	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-423	X500	Shoulder/ Profiling	-	-	-	0,05 - 0,12	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	-	0,05 - 0,10	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-423	SP6519	Shoulder/ Profiling	-	-	0,05 - 0,13	0,05 - 0,11	-	-	-	-	-	0,05 - 0,08	0,05 - 0,08	0,05 - 0,10	0,05 - 0,11	-	-
		Slotting	-	-	0,04 - 0,10	0,04 - 0,09	-	-	-	-	-	0,05 - 0,07	0,05 - 0,07	0,05 - 0,08	0,05 - 0,09	-	-
EN-41	X500	Shoulder/ Profiling	0,05 - 0,15	0,05 - 0,14	0,05 - 0,13	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,13	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,12	0,05 - 0,11	0,05 - 0,11	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	-	-	-
EN-41	SP6519	Shoulder/ Profiling	0,05 - 0,15	0,05 - 0,14	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,13	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,12	0,05 - 0,11	-	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	-	-	-
EN-41	MP91M	Shoulder/ Profiling	0,05 - 0,13	0,05 - 0,13	-	-	0,05 - 0,15	0,05 - 0,15	0,05 - 0,13	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,11	0,05 - 0,10	-	-	0,05 - 0,12	0,05 - 0,12	0,05 - 0,11	-	-	-	-	-	-	-	-
TN	X500	Shoulder/ Profiling	0,15 - 0,18	0,15 -0,17	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	SP6519	Shoulder/ Profiling	0,15 - 0,18	0,15 - 0,17	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	MP91M	Shoulder/ Profiling	-	-	-	-	0,15 - 0,18	0,15 - 0,18	0,15 - 0,17	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: HTA = High Temperature Alloys

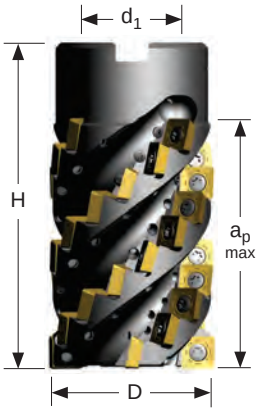
Note: Above feed rates are calculated on centreline.

Speed recommendations can be found on page 55.

STELLRAM

Speed v_c (m/min)

5230VS Series			Wear Resistance – +								
			Speed min. - max.								
Coolant Recommendation Recommended ● Possible ⦿					CVD X Grade			PVD Standard			CVD Standard
ISO	Materials	Rm and Hardness	💧	🚫	X500	💧	🚫	SP6519	💧	🚫	MP91M
P	Unalloyed Steel	<600 N/mm² <180 HBN	⦿	●	130 - 270	⦿	●	130 - 295		●	140 - 345
		<950 N/mm² <280 HBN			115 - 240			115 - 260			120 - 305
	Alloyed Steel	700-950 N/mm² 200-280 HBN	⦿	●	100 - 210	⦿	●	100 - 230		●	105 - 270
		950-1200 N/mm² 280-355 HBN			75 - 160			75 - 175			80 - 205
		1200-1400 N/mm² 355-415 HBN		●	50 - 100		●	50 - 110		●	50 - 130
M	Stainless Steel	Austenitic + Ferritic 300 series	⦿	●	115 - 250	⦿	●	115 - 270			
		Martensitic 400 series			100 - 220			105 - 235			
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 120			
K	Cast Iron	Grey GG-Ft	⦿	●	120 - 280	⦿	●	140 - 295			145 - 365
		Spheroidal-Ductile GGG-FGS			105 - 205			110 - 240		●	115 - 285
		Malleable GTS - MN/MP			95 - 170			100 - 220			105 - 260
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN									
		Aluminium + Silicon > 16% Si 92 HBN									
S	High Temperature Alloys	Iron Based	●		23 - 48	●		23 - 55			
		Cobalt Based			21 - 44			22 - 48			
		Nickel Based			24 - 51			25 - 55			
		Titanium Based			35 - 73			36 - 79			
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN									
		Chilled Cast Iron >1400 N/mm² > 400 HBN									



Shell Mill Fixation

Product		Dimensions (mm)								Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	a_p max Slotting*	No. of flutes	No. of inserts	*EDP*		*EDP*		Screw Tightening Nm
5230VS12 Shell Mill Fixation														
031228	5230VS12-A063Z4R57	63	85	-	27	57	52	4	24	*015270*	F4011T	*015241*	T20	3,10
031229	5230VS12-A063Z4R94	63	124	-	27	94	-	4	40	*015270*	F4011T	*015241*	T20	3,10
031604	5230VS12-A080Z5R65	80	95	-	32	65	60	5	35	*015270*	F4011T	*015241*	T20	3,10
031605	5230VS12-A080Z5R110	80	143	-	32	110	-	5	60	*015270*	F4011T	*015241*	T20	3,10
031232	5230VS12-A100Z6R76	100	106	-	40	76	70	6	48	*015270*	F4011T	*015241*	T20	3,10
031233	5230VS12-A100Z6R133	100	165	-	40	133	-	6	84	*015270*	F4011T	*015241*	T20	3,10

* Note: Please do not surpass the recommended max. a_p for slotting.

Shell Mills are supplied with inserts screws, coolant control screws, steel coolant plug, nord-lock washer and mounting screw.

5230VS12 Spare Parts

Cutter	Coolant control screw			*Screwdriver EDP*		Steel Coolant Plug		Coolant Plug tightening Nm
	Screw EDP	Screw	Qty.			*EDP*	Description	
5230VS12-A063Z4R57	*015062*	F3006T	8	*013214*	T9	*031262*	SB-3229	34
5230VS12-A063Z4R94			12			*031263*	SB-3230	
5230VS12-A080Z5R65			10			*031264*	SB-3231	61
5230VS12-A080Z5R110			15			*031265*	SB-3232	
5230VS12-A100Z6R76			12			*031266*	SB-3233	61
5230VS12-A100Z6R133			18			*031267*	SB-3234	

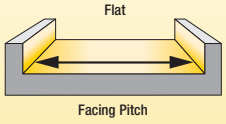
5230VS12 Torque Values and Spare Parts

Cutter	Nord Lock Washer		Mounting Bolt		**Torque Values in Nm	
	EDP	Description	*EDP*	Description	Normal Condition	Excessive Condition
5230VS12-A063Z4R57	*031258*	NLW-0.375	*031268*	M12-1.75 ISO x 30mm SHCS	80	100
5230VS12-A063Z4R94						
5230VS12-A080Z5R65	*031226*	NLW-12SP	*031269*	M16-2 ISO x 40mm SHCS	110	150
5230VS12-A080Z5R110						
5230VS12-A100Z6R76	*031259*	NLW-16SP	*031270*	M20-2.5 ISO x 50mm SHCS	120	180
5230VS12-A100Z6R133						

** Torque values for mounting bolts. Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

5230VS12 Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
031228	5230VS12-A063Z4R57	63	-	-	-	-	21000
031229	5230VS12-A063Z4R94	63	-	-	-	-	21000
031604	5230VS12-A080Z5R65	80	-	-	-	-	18500
031605	5230VS12-A080Z5R110	80	-	-	-	-	18500
031232	5230VS12-A100Z6R76	100	-	-	-	-	16000
031233	5230VS12-A100Z6R133	100	-	-	-	-	16000



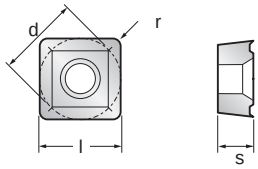
STELLRAM


SDHT12-422


SDHT12-423


SDMT12-41


SDMW12



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max* or a_e max.*	a_p max. and a_e max. 15% D**	a_p min. - max.					
030717	SDHT120412EN-422	X500	◆●	●●●	-	12,70	12,70	4,76	1,20	0,05
030728	SDHT120412EN-422	SP6519	◆●	◆◆◆	-	12,70	12,70	4,76	1,20	0,05
031218	SDHT120412EN-423	X500	■■	-	-	12,70	12,70	4,76	1,20	0,06
031321	SDHT120412EN-423	SP6519	■●	■■■	-	12,70	12,70	4,76	1,20	0,06
014411	SDMT120412EN-41	X500	●	■■●	-	12,70	12,70	4,76	1,20	0,05
031480	SDMT120412EN-41	SP6519	■■●	◆◆■	-	12,70	12,70	4,76	1,20	0,05
017326	SDMT120412EN-41	MP91M	■	●●◆	-	12,70	12,70	4,76	1,20	0,05
015233	SDMW120412TN	X500	●●	-	-	12,70	12,70	4,76	1,20	0,15
034518	SDMW120412TN	SP6519	◆◆	-	-	12,70	12,70	4,76	1,20	0,15
017328	SDMW120412TN	MP91M	◆	-	-	12,70	12,70	4,76	1,20	0,15

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 63.

* Note: Please do not surpass the recommended max. a_p for slotting as shown on the steel body page 56.

* Note: a_p max. for profiling is only possible when a_e < 75% of the Diameter.

** Note: For semi finishing, axial engagement **a_p** for slotting and radial engagement **a_e** for profiling should be max. 15% of the Diameter. SDHT120412EN-423 to be used in unstable conditions.

Note: Feed recommendations can be found on page 58. Speed recommendations can be found on page 59.

STELLRAM

5230VS12 Feeds f_z (mm/flute)

Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
			Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
EN-422	X500	Shoulder/ Profiling	-	-	0,05 - 0,15	0,05 - 0,14	-	-		-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,12	0,05 - 0,11	-	-		-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-422	SP6519	Shoulder/ Profiling	-	-	0,05 - 0,15	0,05 - 0,14	-	-		-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,12	0,05 - 0,11	-	-		-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-423	X500	Shoulder/ Profiling	-	-	-	0,05 - 0,14	-	-		-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	-	0,05 - 0,11	-	-		-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-423	SP6519	Shoulder/ Profiling	-	-	0,05 - 0,15	0,05 - 0,14	-	-		-	-	0,05 - 0,10	0,05 - 0,10	0,05 - 0,11	0,05 - 0,14	-	-
		Slotting	-	-	0,05 - 0,12	0,05 - 0,11	-	-		-	-	0,05 - 0,09	0,05 - 0,09	0,05 - 0,09	0,05 - 0,11	-	-
EN-41	X500	Shoulder/ Profiling	0,05 - 0,17	0,05 - 0,16	0,05 - 0,15	-	0,05 - 0,17	0,05 - 0,17	0,05 - 0,16	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,14	0,05 - 0,13	0,05 - 0,12	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,13	-	-	-	-	-	-	-	-
EN-41	SP6519	Shoulder/ Profiling	0,05 - 0,17	0,05 - 0,16	-	-	0,05 - 0,17	0,05 - 0,17	0,05 - 0,16	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,14	0,05 - 0,13	-	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,13	-	-	-	-	-	-	-	-
EN-41	MP91M	Shoulder/ Profiling	0,05 - 0,17	0,05 - 0,16	-	-	0,05 - 0,17	0,05 - 0,17	0,05 - 0,16	-	-	-	-	-	-	-	-
		Slotting	0,05 - 0,14	0,05 - 0,13	-	-	0,05 - 0,14	0,05 - 0,14	0,05 - 0,13	-	-	-	-	-	-	-	-
TN	X500	Shoulder/ Profiling	0,15 - 0,20	0,15 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	SP6519	Shoulder/ Profiling	0,15 - 0,20	0,15 - 0,18	-	-	-	-	-	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TN	MP91M	Shoulder/ Profiling	-	-	-	-	0,15 - 0,20	0,15 - 0,20	0,15 - 0,18	-	-	-	-	-	-	-	-
		Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-		

Note: HTA = High Temperature Alloys

Note: Above feed rates are calculated on centreline.

Speed recommendations can be found on page 59.

STELLRAM

Speed v_c (m/min)

5230VS Series			Wear Resistance – +								
			Speed min. - max.								
Coolant Recommendation Recommended ● Possible ⦿					CVD X Grade			PVD Standard			CVD Standard
ISO	Materials	Rm and Hardness	💧	🚫	X500	💧	🚫	SP6519	💧	🚫	MP91M
P	Unalloyed Steel	<600 N/mm² <180 HBN	⦿	●	130 - 270	⦿	●	130 - 295		●	140 - 345
		<950 N/mm² <280 HBN			115 - 240			115 - 260			120 - 305
	Alloyed Steel	700-950 N/mm² 200-280 HBN	⦿	●	100 - 210	⦿	●	100 - 230		●	105 - 270
		950-1200 N/mm² 280-355 HBN			75 - 160			75 - 175			80 - 205
		1200-1400 N/mm² 355-415 HBN		●	50 - 100		●	50 - 110		●	50 - 130
M	Stainless Steel	Austenitic + Ferritic 300 series	⦿	●	115 - 250	⦿	●	115 - 270			
		Martensitic 400 series			100 - 220			105 - 235			
	PH Stainless	Refractory P.H.	●		50 - 110	●		50 - 120			
K	Cast Iron	Grey GG-Ft	⦿	●	120 - 280	⦿	●	140 - 295		●	145 - 365
		Spheroidal-Ductile GGG-FGS			105 - 205			110 - 240			115 - 285
		Malleable GTS - MN/MP			95 - 170			100 - 220			105 - 260
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN									
		Aluminium + Silicon > 16% Si 92 HBN									
S	High Temperature Alloys	Iron Based	●		23 - 48	●		23 - 55			
		Cobalt Based			21 - 44			22 - 48			
		Nickel Based			24 - 51			25 - 55			
		Titanium Based			35 - 73			36 - 79			
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN									
		Chilled Cast Iron >1400 N/mm² > 400 HBN									

STELLRAM

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
a_e = Radial engagement
f_z = Feed per tooth
d = Cutter diameter

Formula: Average Chip Thickness (h_m)

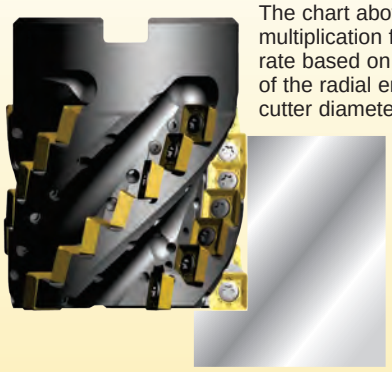
$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

h_m Correction Coefficient Chart

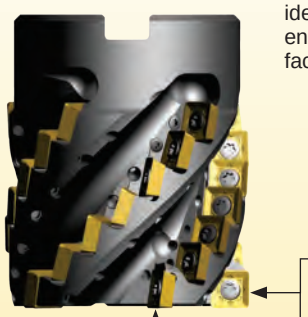
Cutter Ø 50mm			Cutter Ø 63mm			Cutter Ø 80mm			Cutter Ø 100mm		
a_e%	a_e (mm)	Coefficient Factor	a_e%	a_e (mm)	Coefficient Factor	a_e%	a_e (mm)	Coefficient Factor	a_e%	a_e (mm)	Coefficient Factor
5	2,50	2,30	5	3,15	2,30	5	4,00	2,30	5	5,00	2,30
10	5,00	1,66	10	6,30	1,66	10	8,00	1,66	10	10,00	1,66
15	7,5	1,40	15	9,45	1,40	15	12,00	1,40	15	15,00	1,40
20	10,00	1,25	20	12,60	1,25	20	16,00	1,25	20	20,00	1,25
25	12,50	1,16	25	15,75	1,16	25	20,00	1,16	25	25,00	1,16
35	17,50	1,05	35	22,05	1,05	35	28,00	1,05	35	35,00	1,05
50 - 100	25,00 - 50,00	1,00	50 - 100	31,50 - 63,00	1,00	50 - 100	40,00 - 80,00	1,00	50 - 100	50,00 - 100,00	1,00

Example: A 50mm diameter cutter using 5,00mm radial engagement (a_e) = 10% of the cutter diameter.

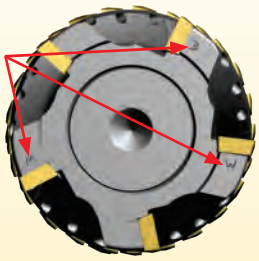
At 10%, your coefficient is 1,66 (see above table); therefore you must multiply your feed rate by 1,66 for correcting the feed for profiling.



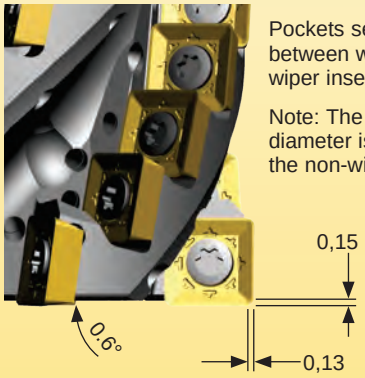
The chart above shows the multiplication factor for the feed rate based on the percentage of the radial engagement of the cutter diameter.



Wiper pockets are identified with a **W** engraved on the face of the body.

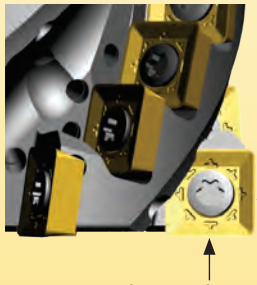


The 5230VS cutter series is designed with wiper pockets which provide a much better face surface finish. The non-wiper pockets generate the 90° corner. The same inserts can be utilised in all pockets.



Pockets setting difference between wiper and non-wiper inserts.

Note: The true cutter diameter is measured at the non-wiper pockets.



Non wiper pocket positions are set back & square to axis to give a true 90 degree approach.

Wiper pocket positions are in front and angled to allow facing.

Cutter Diameter (mm)	No. of Wiper Inserts
50	2
63	2
80	3
100	3

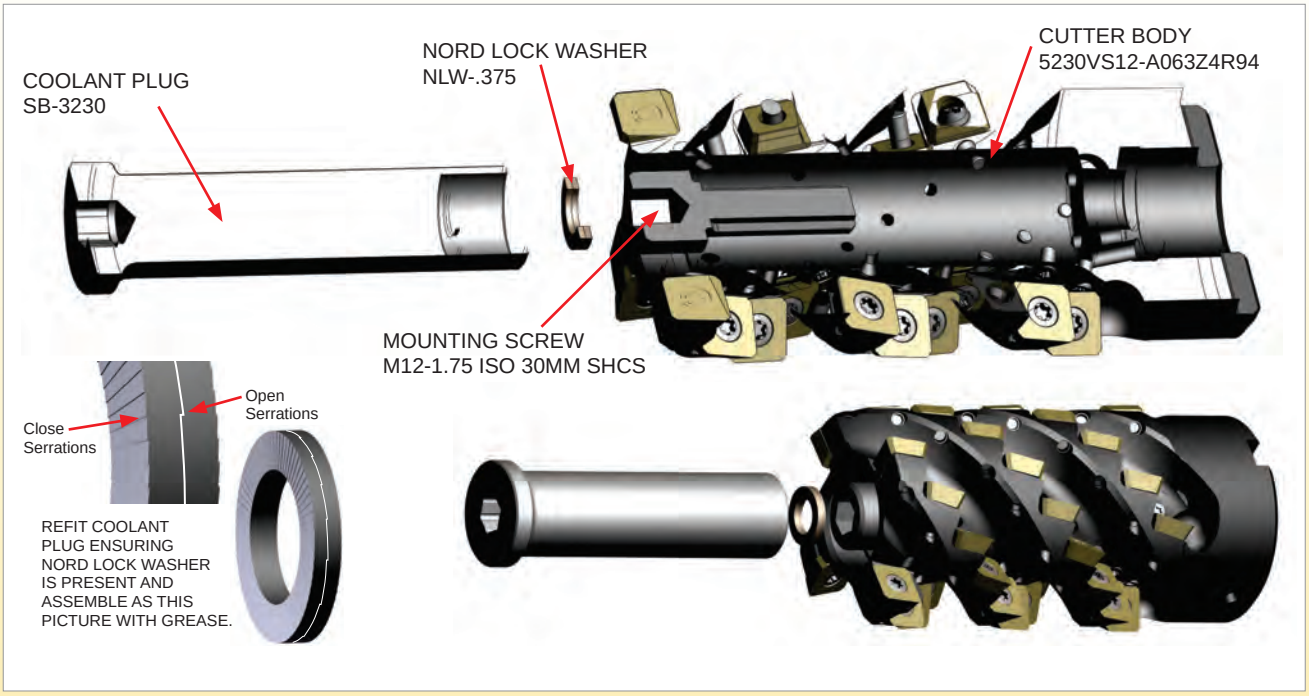
STELLRAM

5230VS09 and VS12 Fitting Instructions for Shell Mill Cutters

NOTE: All Shell Mill 5230VS09 and VS12 Chevron Porcupine Cutters are supplied assembled with mounting bolt, nord lock washer and steel coolant plug.

Please follow the instructions below to disassemble the cutter, attach the cutter to a shell mill adapter and reassemble coolant plug. It is very important to use the proper torque when reassembling the cutter with the mounting bolt, nord lock washer and coolant plug.

Example of cutter: 5230VS12-A063Z4R94 assembly



1. Remove coolant plug. *(Note: Ensure the nord lock washer is retained to the bottom of the coolant plug.)*
2. Fit the cutter body to the shell mill adapter and secure using the mounting bolt supplied with the cutter.
   Note: The mounting bolt must be properly torqued to the specified torque setting shown in the above chart in (page 62) Detail 1.
3. Refit coolant plug ensuring nord lock washer is present and in the proper location on the bottom of the coolant plug.
   A small amount of grease can be used to hold the nord lock washer in place.
4. Tighten coolant plug with specified torque setting shown in the above chart in (page 62) Detail 2.
5. Note: If axial depth of cut (a_p) is less then maximum a_p of the cutter, then F3006T coolant control screws supplied separately can be used to block coolant holes forcing more coolant to the front of the cutter. If these screws are used, please secure with loctite or similar product.

Torque values for mounting bolts
Excessive condition is when long reach extensions are required or when cutting parameters are elevated to extreme parameters.

5230VS09	Detail 1			Detail 2	
Cutter	Mounting Bolt Description	**Torque Values in Nm for Mounting Bolt		Coolant Plug Description	Coolant Plug tightening Nm
		Normal Condition	Excessive Condition		
5230VS09-A050Z4R51	M12-1.75 ISO x 30mm SHCS	80	100	SB-3413	34
5230VS09-A050Z4R80				SB-3621	

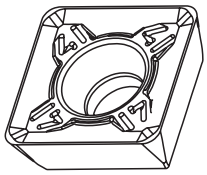
5230VS12	Detail 1			Detail 2	
Cutter	Mounting Bolt Description	**Torque Values in Nm for Mounting Bolt		Coolant Plug Description	Coolant Plug tightening Nm
		Normal Condition	Excessive Condition		
5230VS12-A063Z4R57	M12-1.75 ISO x 30mm SHCS	80	100	SB-3229	34
5230VS12-A063Z4R94				SB-3230	
5230VS12-A080Z5R65	M16-2 ISO x 40mm SHCS	110	150	SB-3231	61
5230VS12-A080Z5R110				SB-3232	
5230VS12-A100Z6R76	M20-2.5 ISO x 50mm SHCS	120	180	SB-3233	61
5230VS12-A100Z6R133				SB-3234	

Hex Keys

M12 = Hex Key Size 10
M16 = Hex Key Size 14
M20 = Hex Key Size 17

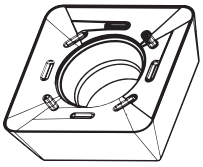
STELLRAM

5230 Geometries



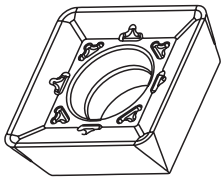
-41 P P K

This general purpose utility geometry has a positive cutting action and reinforced cutting edge for medium roughing and semi-finishing applications.



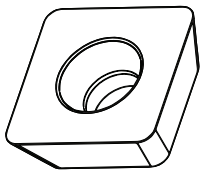
-422 M M S

This positive geometry features an 11° chip angle and an "E" edge preparation for roughing and semi-finishing applications in difficult to machine materials.



-423 S

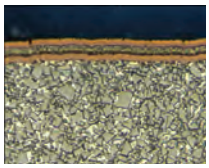
A strong positive geometry featuring a smaller primary angle and a small controlled hone to reduce cutting pressures, followed by a higher secondary angle to allow free cutting of the chip without rubbing on the insert rake face. Chip flow compresses the chip for easy evacuation.



-TN P P K

This geometry is a flat top design with a strong T-land edge preparation for preventing chipping in unstable conditions. It has a smaller edge preparation which reduces machine power consumption.

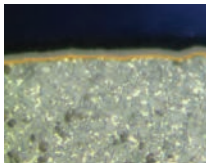
5230 Grades



X500 M S

Coating Type: CVD, TiN-TiC-TiN, X-Grade™ Technology

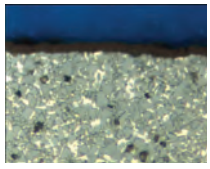
High level of shock resistance; operates at the low to medium cutting speeds; high metal removal rates while retaining a secure cutting edge.



MP91M K

Coating Type: CVD, TiN-MT-TiCN-Al2O3

With its Aluminium Oxide coating, this grade is recommended every time wear characteristics are more important than toughness.



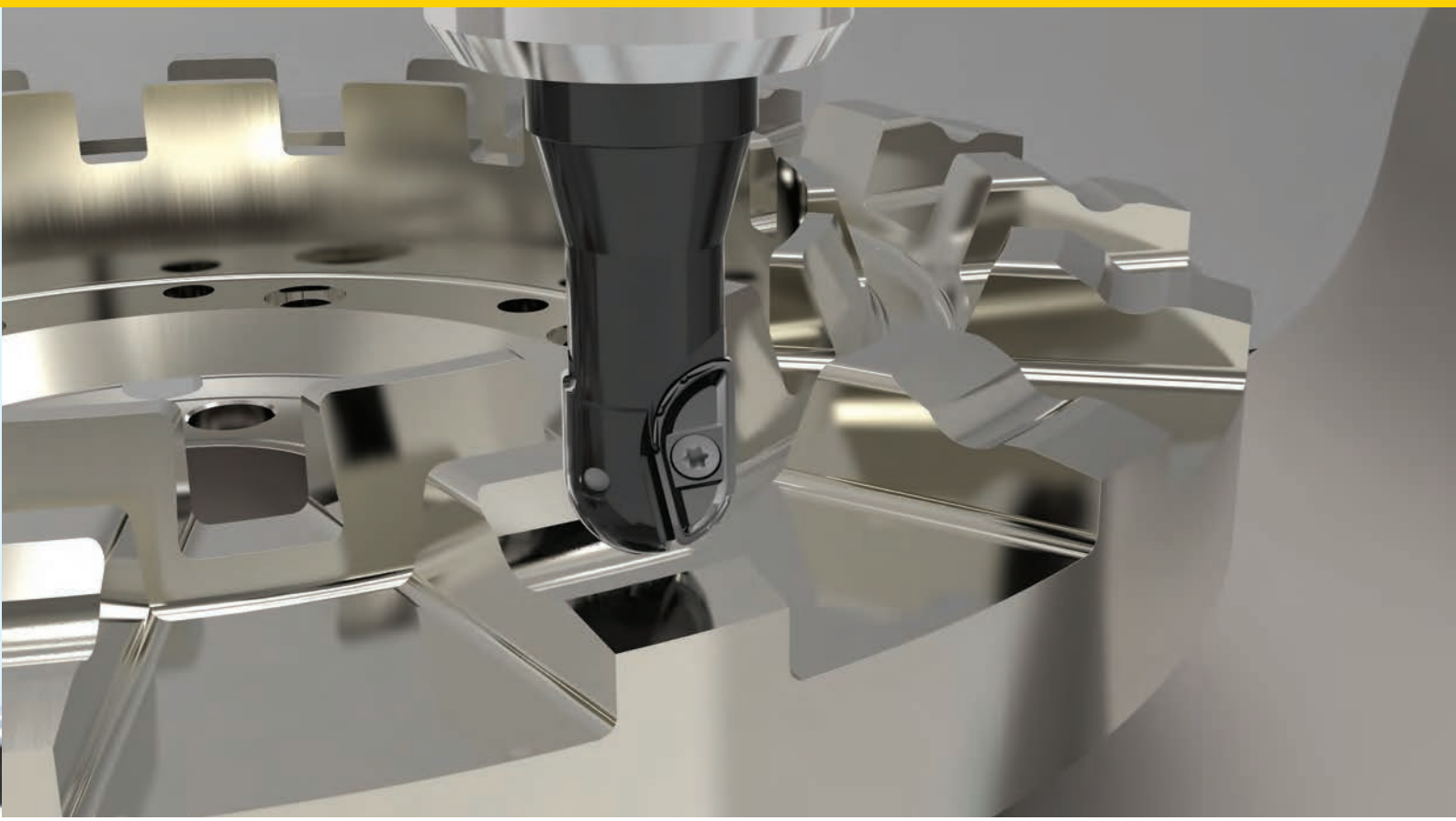
SP6519 P P M M S

Coating Type: PVD, TiAlN

This grade features a combination of a tough substrate with a new generation of TiAlN super nano coating, making it virtually free of residual stress and extremely hard for unmatched performance.

Material Guide – Key to Recommended Inserts

Material Designation							
P Unalloyed Steels	P Alloyed Steels	M Stainless Steels	M PH Stainless	K Cast Irons	N Aluminum & Alloys	S High Temp. Alloys	H Hard Materials



5505 Ball Nose Contour Milling

Contour Milling of Mild Steels to High Temperature Superalloys

5505VX State of the Art Ball Nose Cutters

Weldon
20mm – 50mm

- Reinforced design for heavy machining
- High volume of chip cutting
- Excellent chip control and evacuation

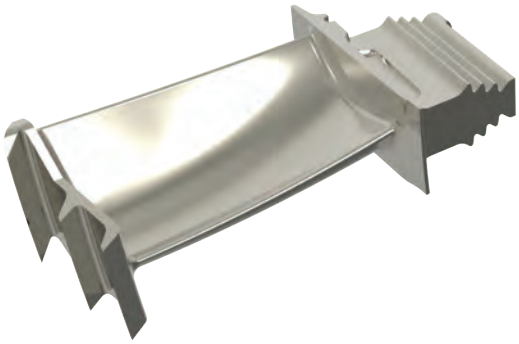
Cylindrical
16mm – 32mm

5505VX Ball Nose Cutters are ideal for roughing and semi-finishing of profiles and complex contours in Steel, Alloyed Steel, Stainless Steel, High Temperature Alloys and Cast Iron.

- One grade, one geometry does it all
- Helical insert design and rigid fixation for increased speeds and feeds
- Double edge insert is indexable for reduced inventory
- Slotting to full radius

Modular
16mm – 32mm

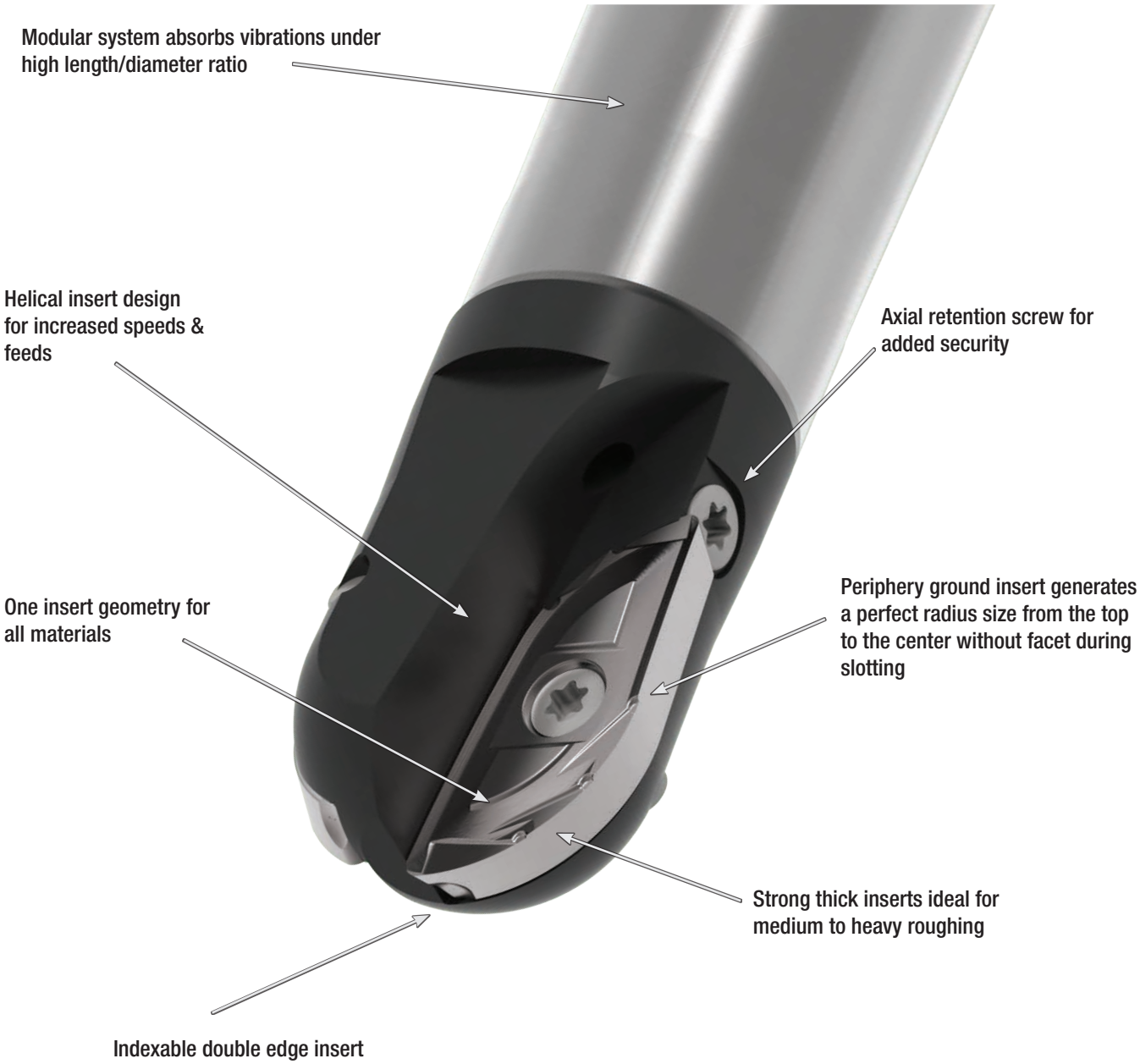
Case History

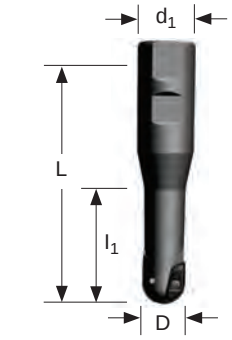


Material: Stainless Steel 403
Cutter: 5505VX (25mm Cutter)
Component: Turbine Blade
Industry: Power Generation
Insert Grade: SP6519
RPM: 2293
Cutting Speed V_C: 183 m/min
Feed per Tooth f_Z: 0,28mm
Feed Rate: 1285 mm/min
Depth of cut a_p: 3,18mm

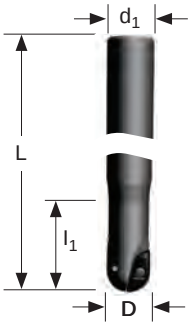
40% Increase in Productivity

5505VX Heavy Duty Ball Nose Cutters



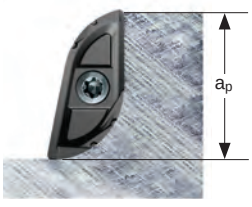


Weldon Shank



Cylindrical Shank

Modular Head



Depth of Cut (a_p)

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
	5505VX Weldon Shank											
032133	5505VX20WA020R34	20	106	34	25	20	2	*030672*	FP3007T	*031451*	TP8	1,80
030840	5505VX25WA025R60	25	116	60	25	25	2	*015262*	D4010T	*015240*	T15	3,10
032132	5505VX25WA025R69	25	150	69	32	25	2	*015262*	D4010T	*015240*	T15	3,10
030842	5505VX32WA032R75	32	130	75	32	32	2	*015266*	D5013T	*015241*	T20	6,00
030843	5505VX32WA032R100	32	160	100	32	32	2	*015266*	D5013T	*015241*	T20	6,00
030844	5505VX40WA040R100	40	170	100	40	40	2	*029640*	D6014T	*015241*	T20	10,50
030845	5505VX40WA040R150	40	220	150	40	40	2	*029640*	D6014T	*015241*	T20	10,50
030846	5505VX50WA050R100	50	170	100	40	50	2	*029641*	F8017S	*018288*	KH5005	24,50
030847	5505VX50WA050R150	50	230	150	50	50	2	*029641*	F8017S	*018288*	KH5005	24,50
	5505VX Cylindrical Shank											
030982	5505VX16CA20/016R30	16	180	30	20	16	2	*031448*	FP3006T	*031451*	TP8	1,80
030983	5505VX20CA25/020R40	20	200	40	25	20	2	*030672*	FP3007T	*031451*	TP8	1,80
030984	5505VX25CA025R55	25	250	55	25	25	2	*015262*	D4010T	*015240*	T15	3,10
030985	5505VX25CA32/025R55	25	250	55	32	25	2	*015262*	D4010T	*015240*	T15	3,10
030986	5505VX32CA032R65	32	250	65	32	32	2	*015266*	D5013T	*015241*	T20	6,00

Product		Dimensions (mm)						Spares				
EDP	Item Description	D	L/H	M	d_1	a_p max	No. of Teeth	*EDP*		*EDP*		Screw Tightening Nm
	5505VX Modular Head											
030849	5505VX16SA016R25	16	25	M8	8.5	16	2	*031448*	FP3006T	*031451*	TP8	1,80
030850	5505VX20SA020R35	20	35	M10	10.5	20	2	*030672*	FP3007T	*031451*	TP8	1,80
030851	5505VX25SA025R40	25	40	M12	12.5	25	2	*015262*	D4010T	*015240*	T15	3,10
030852	5505VX32SA032R50	32	50	M16	17.0	32	2	*015266*	D5013T	*015241*	T20	6,00

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 74.

Note: Do not remove the radial screw; this is a fixed location for the insert see page 72.

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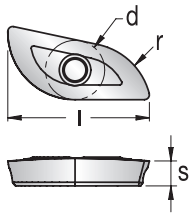
5505VX Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
032133	5505VX20WA020R34	-	85	-	-	-	34750
030840	5505VX25WA025R60	-	85	-	-	-	30500
032132	5505VX25WA025R69	-	85	-	-	-	30500
030842	5505VX32WA032R75	-	85	-	-	-	23250
030843	5505VX32WA032R100	-	85	-	-	-	23250
030844	5505VX40WA040R100	-	85	-	-	-	17250
030845	5505VX40WA040R150	-	85	-	-	-	17250
030846	5505VX50WA050R100	-	85	-	-	-	17250
030847	5505VX50WA050R150	-	85	-	-	-	17250
030982	5505VX16CA20/016R30	-	85	-	-	-	54000
030983	5505VX20CA25/020R40	-	85	-	-	-	34750
030984	5505VX25CA025R55	-	85	-	-	-	30500
030985	5505VX25CA32/025R55	-	85	-	-	-	30500
030986	5505VX32CA032R65	-	85	-	-	-	23250
030849	5505VX16SA016R25	-	85	-	-	-	54000
030850	5505VX20SA020R35	-	85	-	-	-	34750
030851	5505VX25SA025R40	-	85	-	-	-	30500
030852	5505VX32SA032R50	-	85	-	-	-	23250


Ramping

XPNT-F



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max.*	a_e / a_p max. 10% of the cutter diameter	a_e / a_p max. -					
030737	XPNT16/160308.R-F	SP6519	◆◆◆◆◆◆	◆◆◆◆◆◆	-	7,40	17,40	3,18	8,00	0,04
030743	XPNT20/20T306.R-F	SP6519	◆◆◆◆◆◆	◆◆◆◆◆◆	-	9,00	20,85	3,97	10,00	0,04
030746	XPNT25/250408.R-F	SP6519	◆◆◆◆◆◆	◆◆◆◆◆◆	-	11,00	26,00	4,76	12,50	0,04
030749	XPNT32/320612.R-F	SP6519	◆◆◆◆◆◆	◆◆◆◆◆◆	-	14,10	33,40	6,35	16,00	0,04
030755	XPNT40/40T716.R-F	SP6519	◆◆◆◆◆◆	◆◆◆◆◆◆	-	18,00	41,84	7,95	20,00	0,04
030758	XPNT50/50T716.R-F	SP6519	◆◆◆◆◆◆	◆◆◆◆◆◆	-	22,25	52,86	7,95	25,00	0,04

Machining Choice: ◆ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 73.

* Note: a_p max. is dependent on several insert sizes, see steel cutter page 84 for a_p max.

5505VX Feeds f_z (mm/tooth)

Tool Diameter	Geometry	Grade	Operation	Unalloyed Steel	Alloyed Steel	Stainless Steel	Stainless Steel Refractory PH	Gray Iron	Spheroidal-Ductile Iron	Malleable Iron	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN	HTA Iron Based Alloys	HTA Cobalt Based Alloys	HTA Nickel Based Alloys	HTA Titanium Based Alloys	Hard Steel >1400 N/mm² >415 HBN	Chilled Cast Iron >1400 N/mm² >400 HBN
				Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.	Min. - Max.
16	R-F	SP6519	Contouring	0,06 - 0,15	0,06 - 0,13	0,04 - 0,11	0,04 - 0,10	0,06 - 0,15	0,06 - 0,15	0,06 - 0,15	-	-	0,04 - 0,08	0,04 - 0,08	0,04 - 0,08	0,04 - 0,10	-	-
20	R-F	SP6519	Contouring	0,06 - 0,17	0,06 - 0,15	0,04 - 0,13	0,04 - 0,12	0,06 - 0,17	0,06 - 0,17	0,06 - 0,17	-	-	0,04 - 0,10	0,04 - 0,10	0,04 - 0,10	0,04 - 0,12	-	-
25	R-F	SP6519	Contouring	0,06 - 0,20	0,06 - 0,18	0,04 - 0,16	0,04 - 0,15	0,06 - 0,20	0,06 - 0,20	0,06 - 0,20	-	-	0,04 - 0,13	0,04 - 0,13	0,04 - 0,13	0,04 - 0,15	-	-
32	R-F	SP6519	Contouring	0,06 - 0,22	0,06 - 0,20	0,04 - 0,18	0,04 - 0,17	0,06 - 0,22	0,06 - 0,22	0,06 - 0,22	-	-	0,04 - 0,15	0,04 - 0,15	0,04 - 0,15	0,04 - 0,17	-	-
40	R-F	SP6519	Contouring	0,06 - 0,24	0,06 - 0,22	0,04 - 0,20	0,04 - 0,19	0,06 - 0,24	0,06 - 0,24	0,06 - 0,24	-	-	0,04 - 0,17	0,04 - 0,17	0,04 - 0,17	0,04 - 0,19	-	-
50	R-F	SP6519	Contouring	0,06 - 0,27	0,06 - 0,25	0,04 - 0,23	0,04 - 0,22	0,06 - 0,27	0,06 - 0,27	0,06 - 0,27	-	-	0,04 - 0,20	0,04 - 0,20	0,04 - 0,20	0,04 - 0,22	-	-

Note: HTA = High Temperature Alloys

Speed recommendations can be found on page 71.

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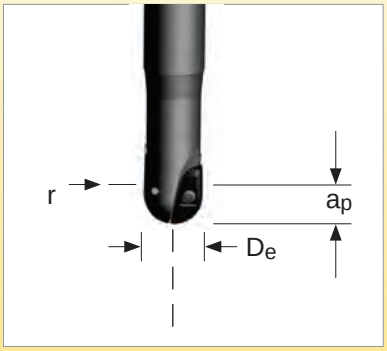
Speed v_c (m/min)

5505VX Series					
			Speed min. - max.		
Coolant Recommendation Recommended ● Possible ⦿					PVD Standard
ISO	Materials	Rm and Hardness	💧	🚫	SP6519
P	Unalloyed Steel	<600 N/mm² <180 HBN	⦿	●	130 - 295
		<950 N/mm² <280 HBN			115 - 260
	Alloyed Steel	700-950 N/mm² 200-280 HBN	⦿	●	100 - 230
		950-1200 N/mm² 280-355 HBN			75 - 175
		1200-1400 N/mm² 355-415 HBN		●	50 - 110
M	Stainless Steel	Austenitic + Ferritic 300 series	⦿	●	115 - 270
		Martensitic 400 series			105 - 235
	PH Stainless	Refractory P.H.	●		50 - 120
K	Cast Iron	Grey GG-Ft	⦿	●	140 - 295
		Spheroidal-Ductile GGG-FGS			110 - 240
		Malleable GTS - MN/MP			100 - 220
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN			
		Aluminium + Silicon > 16% Si 92 HBN			
S	High Temperature Alloys	Iron Based	●		23 - 55
		Cobalt Based			22 - 48
		Nickel Based			25 - 55
		Titanium Based			36 - 79
H	Hard Materials	Hard Steel >1400 N/mm² >415 HBN			
		Chilled Cast Iron >1400 N/mm² > 400 HBN			

5505VX Technical Information



Working Diameter:

$$D_e = 2 \times \sqrt{r^2 - (r - a_p)^2}$$

where:

D_e	=	Working Diameter
r	=	Cutter radius
a_p	=	Axial Depth of Cut

5505VX Technical Information

where:

f_z	= Feed per tooth	a_e	= Radial Depth of Cut
h_m	= Average chip thickness	a_p	= Axial Depth of Cut
r	= Insert radius		

Average chip thickness: h_m

$$h_m = f_z \times \frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}$$

To find programmed feedrate: f_z

$$f_z = \frac{h_m}{\frac{\sqrt{r^2 - (r - a_e)^2}}{r} \times \frac{\sqrt{r^2 - (r - a_p)^2}}{r}}$$

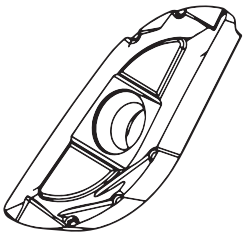
Please do not try to remove this screw. This screw is glued into the body to keep the inserts in the correct position.

Case History

Material: Titanium 6-4
Component: Valve Body
Industry: Oil & Gas
Cutter: 5505VX (25mm Cutter)
Insert Grade: SP6519
RPM: 1469
Cutting Speed V_C: 115 m/min
Feed per Tooth f_Z: 0,135mm
Feed Rate: 395,3 mm/min
Depth of cut a_p: 1,5mm

Helical Interpolation Doubled Productivity

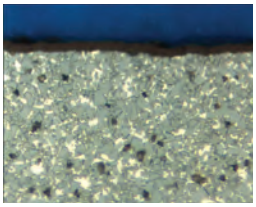
Ball Nose Geometry



-F P P M M K S

This geometry is a roughing ball nose fully ground insert for roughing and semi-finishing of all materials except Aluminium. This geometry is designed with chip grooves for better chip control.

Ball Nose Grade



SP6519 P P M M K S

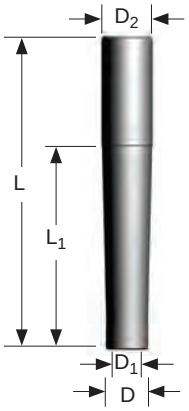
Coating Type: PVD, TiAlN

The combination of a tough substrate with a new generation of TiAlN super nano coating, makes this new PVD coating virtually free of residual stress and extremely hard for unmatched performance.

Primarily used in Stainless Steel, High Temperature Alloys & Titanium with stable conditions. Also can be used in Steel, Steel Alloys and Cast Irons.

Material Guide – Key to Recommended Inserts

Material Designation							
P Unalloyed Steels	P Alloyed Steels	M Stainless Steels	M PH Stainless	K Cast Irons	N Aluminum & Alloys	S High Temp. Alloys	H Hard Materials



Shank Extension

Product		Dimensions (mm)					
EDP	Item Description	L	L_1	D_2	D	D_1	M
030624	M-13-M8-CA16-090	90	40	16	13	8,50	M8
030625	M-13-M8-CA16-110	110	60	16	13	8,50	M8
030626	M-13-M8-CA16-130	130	80	16	13	8,50	M8
030627	M-13-M8-CA16-170	170	120	16	13	8,50	M8
030628	M-18-M10-CA20-110	110	60	20	18	10,50	M10
030629	M-18-M10-CA20-130	130	80	20	18	10,50	M10
030630	M-18-M10-CA20-170	170	120	20	18	10,50	M10
030631	M-18-M10-CA20-190	190	140	20	18	10,50	M10
030632	M-21-M12-CA25-131	131	75	25	21	12,50	M12
030633	M-21-M12-CA25-156	156	100	25	21	12,50	M12
030634	M-21-M12-CA25-181	181	125	25	21	12,50	M12
030635	M-21-M12-CA25-206	206	150	25	21	12,50	M12
030636	M-21-M12-CA25-231	231	175	25	21	12,50	M12
030637	M-29-M16-CA32-160	160	100	32	29	17,00	M16
030638	M-29-M16-CA32-210	210	150	32	29	17,00	M16
030639	M-29-M16-CA32-260	260	200	32	29	17,00	M16
030640	M-29-M16-CA32-310	310	250	32	29	17,00	M16

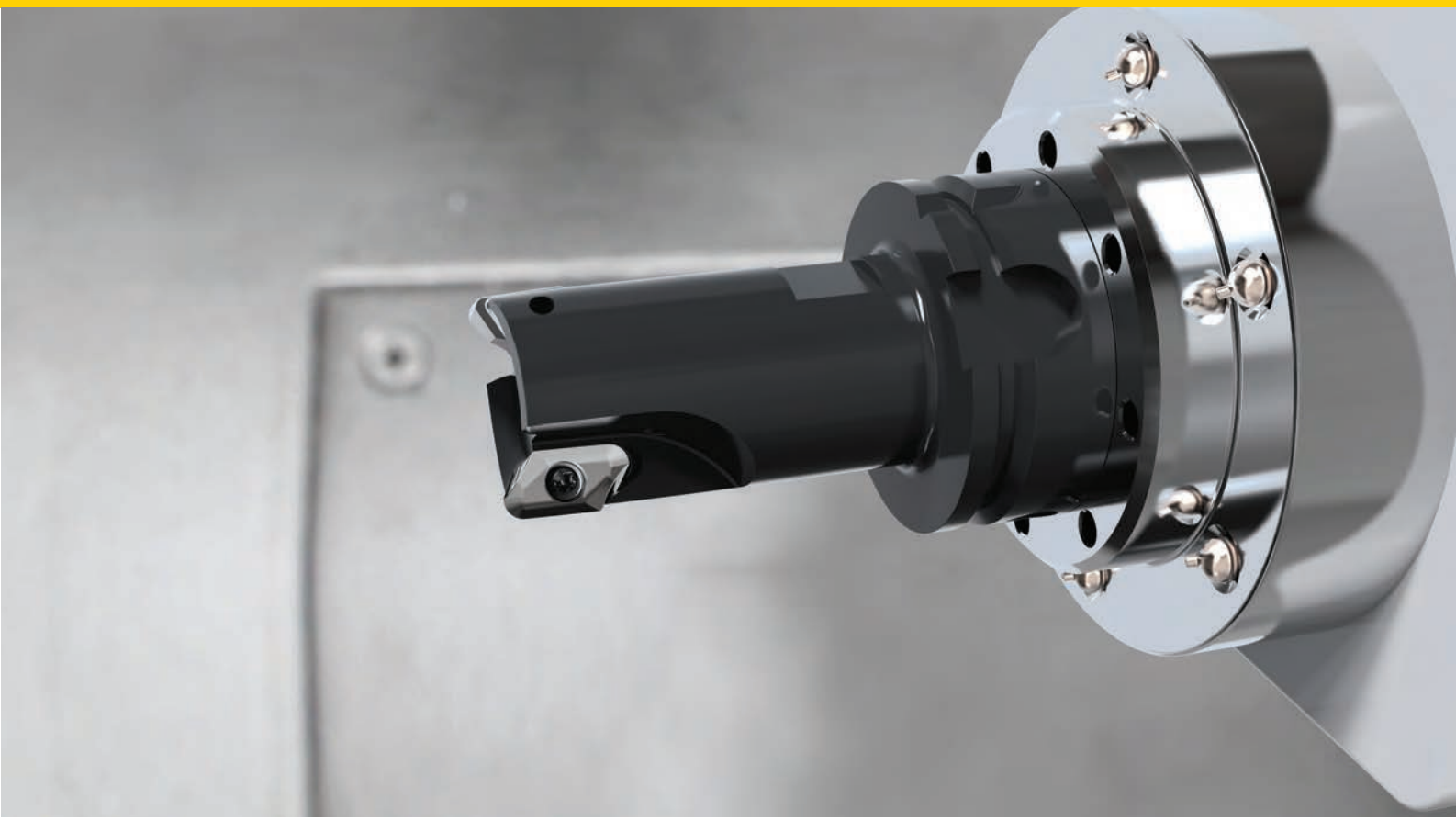
Note: Order example with cylindrical shank: M-13-M8-CA16-090

Cylindrical shank extensions can be used with all modular heads found in several product family series within this catalogue.

These extensions have the industry standard of metric threads.

Technical Advice

M	Modular adapter
13	Diameter in front of the modular shank (D)
M8	Metric Thread (M)
CA16	Cylindrical shank diameter 16mm with through coolant
90	Total length of the body



5720 Patented Profile Pocket Milling: Aluminium

Taking extreme high speed aluminium machining to the highest level

5720 Patented Series High Speed Aluminium Cutters

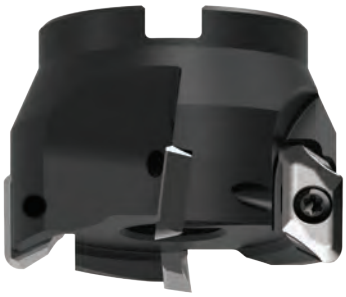
5720 Up to 51000 RPM

Cylindrical

25mm – 32mm

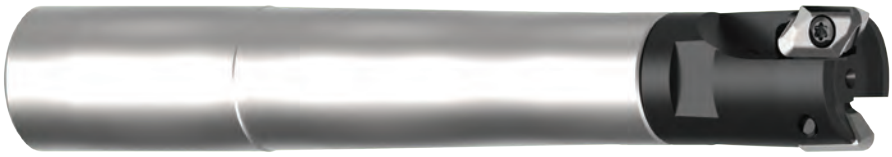
Shell

40mm – 80mm



Modular

25mm – 32mm



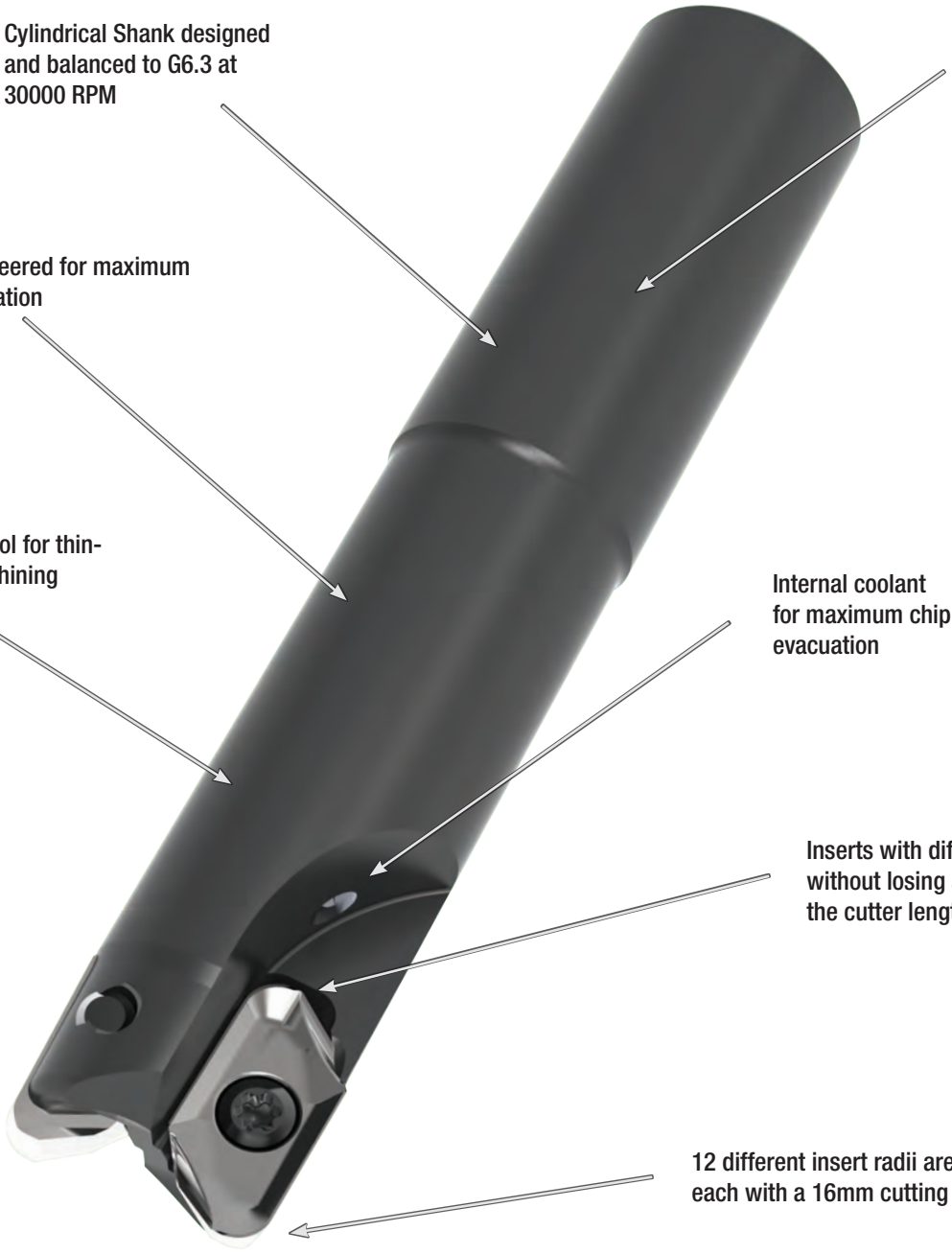
Extreme Metal Removal to fit your application

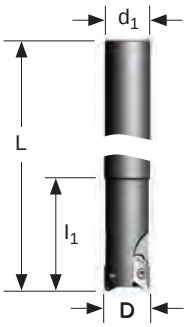
- Especially designed for machining pockets and profiles on Aluminium and Aluminium Alloys
- The 5720 is designed, manufactured and tested in accordance with EN ISO 15641:2001 to ensure maximum stability in high speed applications
- Each features internal coolant allowing better chip evacuation and higher feed rates
- The pockets are reinforced to allow for heavy feeding and safe ramping during machining
- Excellent tools for thin-walled machining
- HSK specials available upon request

Cylindrical Shank and special HSK Integral Shanks are balanced to G6.3 @ 30000 RPM for diameters up to 50mm. Diameters larger than 50mm are balanced to G6.3 @ 24000 RPM.

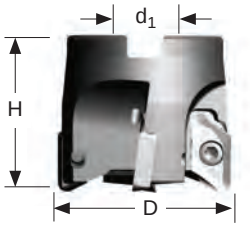
5720 inserts: 12 different radii are available, each with the same cutting depth capacity of 16mm

5720 Patented Series Extreme High Speed Aluminium Cutters





Cylindrical Shank



Shell Mill Fixation

Modular Head

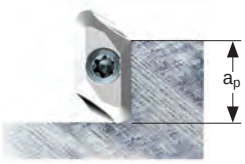
Product		Dimensions (mm)							Spares				
EDP	Item Description	D	L/H	l_1	d_1	ap max	No. of Teeth	Insert radius range	*EDP*		*EDP*		Screw Tightening Nm*
5720VZ16 Cylindrical Shank - Coarse and Medium Pitch													
034614	5720VZ16CA025Z2R75	25	131	75	25	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
034617	5720VZ16CA032Z2R75	32	135	75	32	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
034640	5720VZ16CA032Z3R75	32	135	75	32	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
5720VZ16 Shell Mill Fixation - Coarse and Medium Pitch													
034619	5720VZ16-A040Z03R	40	45	-	16	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031325	5720VZ16-A050Z03R	50	45	-	22	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031326	5720VZ16-A050Z04R	50	45	-	22	16	4	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031328	5720VZ16-A063Z05R	63	45	-	22	16	4	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031327	5720VZ16-A063Z04R	63	45	-	22	16	5	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031329	5720VZ16-A080Z04R	80	50	-	27	16	4	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031330	5720VZ16-A080Z05R	80	50	-	27	16	5	Facet to 6,00	030820	DP5009A	030819	TP20	6,00

*** It is important to change the screw each time the insert is changed to ensure the highest security.**
A dynamometric key and the right torque value are important. See above for the correct torque information.

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	L/H	M	d_1	ap max	No. of Teeth	Insert radius range	*EDP*		*EDP*		Screw Tightening Nm*
5720VZ16 Modular Head - Coarse and Medium Pitch													
034616	5720VZ16SA025Z2R50	25	50	M12	12,50	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
034618	5720VZ16SA032Z2R50	32	50	M16	17	16	2	Facet to 6,00	030820	DP5009A	030819	TP20	6,00
031639	5720VZ16SA032Z3R50	32	50	M16	17	16	3	Facet to 6,00	030820	DP5009A	030819	TP20	6,00

*** It is important to change the screw each time the insert is changed to ensure the highest security.**
A dynamometric key and the right torque value are important. See above for the correct torque information.

Note: For cylindrical shank extensions in high density alloy with through coolant refer to page 74.



Depth of Cut (ap)

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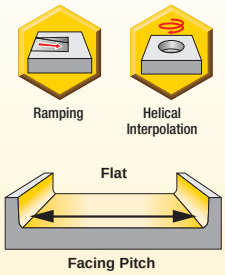
5720VZ Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
034614	5720VZ16CA025Z2R75	25	14.5*	29,5	48,0	4,00	50000
034617	5720VZ16CA032Z2R75	32	11.4*	43,5	62,0	4,00	41500
034640	5720VZ16CA032Z3R75	32	11.4*	43,5	62,0	4,00	41500
034619	5720VZ16-A040Z3R	40	7.6*	59,5	78,0	4,00	36500
031325	5720VZ16-A050Z03R	50	7.9*	79,5	98,0	4,00	30000
031326	5720VZ16-A050Z4R	50	7.9*	79,5	98,0	4,00	30000
031328	5720VZ16-A063Z05R	63	5.9*	105,5	124,0	4,00	26000
031327	5720VZ16-A063Z4R	63	5.9*	105,5	124,0	4,00	26000
031329	5720VZ16-A080Z04R	80	4.4*	139,5	158,0	4,00	23000
031330	5720VZ16-A080Z05R	80	4.4*	139,5	158,0	4,00	23000
034616	5720VZ16SA025Z2R50	25	14.5*	29,5	48,0	4,00	50000
034618	5720VZ16SA032Z2R50	32	11.4*	43,5	62,0	4,00	41500
031639	5720VZ16SA032Z3R50	32	11.4*	43,5	62,0	4,00	41500



* Max. ramping angle for insert is calculated with facet

Find the different ramping angles for all available insert radii on technical information page 81.

Radial depth of cut 0,20mm up to full cutter diameter.

These tools have been designed, manufactured and tested in accordance with EN ISO standard 15641:2001.

These tools are stocked without an electronic chip.

Note: If using a insert with radius, then the facing pitch for the 5702VZ cutter is equal to the cutting diameter (D) minus 2 x chosen radius.

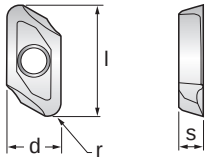
Cylindrical Shanks or Special HSK Integral Shanks are designed and balanced to G6.3 at 30,000 RPM for diameters 50mm and below. Diameters larger then 50mm are balanced to G6.3 at 24,000 rpm.

Cylindrical Shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance as an assembly by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Shell Mills and Modular Heads are not balanced. These tools must be re-inspected for balance as an assembly, cutter + adapter + inserts + screws by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Additional Balancing and Torque values can be found in the technical section pages 82.

ZDET16-721



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max. 16*	a_p min. - max. 1,00 - 5,00	a_p min. - max. 0,20 - 1,00					
030927	ZDET16M5PDFR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	Facet	0,02
031384	ZDET16M504FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	0,40	0,02
030928	ZDET16M508FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	0,80	0,02
031385	ZDET16M512FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	1,20	0,02
030929	ZDET16M516FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	1,60	0,02
030930	ZDET16M520FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	2,00	0,02
030931	ZDET16M525FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	2,50	0,02
030932	ZDET16M530FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	3,00	0,02
030933	ZDET16M532FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	3,20	0,02
030934	ZDET16M540FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	4,00	0,02
030935	ZDET16M550FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	5,00	0,02
030936	ZDET16M560FR-721	GH1	⧫	⧫	⧫	11,30	22,92	5,00	6,00	0,02

Machining Choice: ⧫ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 84.

* Max. possible a_p of 16mm and a_e the full diameter (depending on the application).

* For Slotting applications with 5720VZ16 series please see recommendations for maximum a_p on page 81 .

5720VZ Feeds f_z (mm/tooth)

Size	Geometry	Grade	Operation	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN
				Min. - Max.	Min. - Max.
14mm	FR-721	GH1	Profile/ Pocketing	0,02 - 0,25	0,02 - 0,20

Speed v_c (m/min)

5720VZ Series			K10-K20/C3 - C2 ISO / ANSI	
			Speed min. - max.	
Coolant Recommendation Recommended ● Possible ⦿				Uncoated Micrograin
ISO	Materials	Rm and Hardness		GH1
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	●	400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN	●	295 - 2440

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Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
a_e = Radial engagement
f_z = Feed per tooth
d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

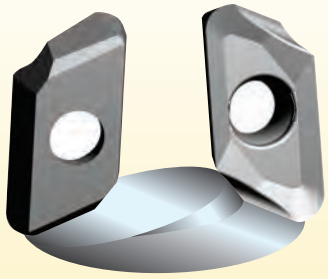
5720VZ16 Ramp Angle °

	Insert ZDET16M5…FR-721 (Radius mm)								
Cutter Dia. (mm)	PDFR to R1,20	R1,60	R2,00	R2,50	R3,00	R3,20	R4,00	R5,00	R6,00
25,0	14.50	17.30	9.40	9.60	18.80	18.90	9.00	11.20	7.30
32.0	11.40	11.90	11.90	12.20	12.40	12.40	13.10	13.80	13.40
40,0	7.60	7.80	7.80	8.00	8.10	8.10	8.50	8.80	9.10
50,0	7.90	7.20	7.30	7.90	7.60	7.60	8.90	9.00	9.25
63,0	5.90	5.40	5.50	5.80	5.60	5.60	6.90	6.60	6.65
80,0	4.40	4.00	4.10	4.30	4.20	4.20	5.10	4.80	4.90

Possible Max. a_p Slotting

Chart for maxium a_p when slotting with 5720VZ16 series

Diameter (mm)	No. of Inserts	a_p max (mm)
25	2	7,50
32	2	11,00
32	3	6,00
40	3	9,00
50	3	11,00
50	4	9,00
63	4	11,00
63	5	9,00
80	4	11,00
80	5	11,00



Possible Metal Removal

Calculated with 24000 RPM

Cutter dia.	Z	Qcm³/min
25	2	1560
32	2	3226
32	3	2056
40	3	5184
50	3	7921
50	4	8641
63	4	13307
63	5	13609
80	4	16898
80	5	21123

a_p max in connection with: The cutter diameter, rigidity of the cutter, rigidity of the machine and the size of the flute.

The chart above shows total metal removal capacity (based on 24,000 RPM) by cutter diameter and number of teeth.

The maximum RPM is engraved on all cutter bodies.

Machinability by Materials (Aluminium)

Alloy Group	Alloy Designation	CHEMICAL COMPOSITION LIMITS (WT%)												Typical tremper	Rm (Mpa)	Machinability Chip formation	Machinability	Typical Applications	v_c m/min min. - max.	f_z mm/Z max.
		Cu	Si	Fe	Mn	Mg	Zn	Cr	Ti	Pb	Bi	Al	Others							
Al	1050	0.05	0.25	0.4	0.5	0.05	0.05	-	-	-	-	99.50min	-	H14	105	D	A	Chemical equipment Sheet metal work Coiled tube	600 - 3000	0,2
	1100	0.05~0.20	Si+Fe1.0max		0.05	-	0.1	-	-	-	-	99.00min	-	H14	90	D	A			
Al-Cu	2011	50.~60.	0.4	0.7	-	-	0.3	-	-	0.2	0.6	remaining	-	T3	310	A	A	Screw machine products. Tuck frame. Aircraft structure. Jet engine impellers. Aircraft engine cylinder heads.	400 - 2500	0,25
	2014	3.9~5.0	0.5~1.2	0.7	0.4~1.2	0.2~0.8	0.25	0.1	0.15	-	-	remaining	-	T6	430	B	A			
	2017	3.5~4.5	0.2~0.8	0.7	0.4~1.0	0.4~0.8	0.25	0.1	0.15	-	-	remaining	-	T4	390	B	A			
	2024	3.8~4.9	0.5	0.5	0.3~0.9	1.2~1.8	0.25	0.1	0.15	-	-	remaining	-	T4	465	B	A			
	2218	3.5~4.5	0.9	1	0.2	1.2~1.8	0.25	0.1	-	-	-	remaining	Ni1.7~2.3	T72	331	B	B			
	2224	3.8~4.4	0.12	0.15	0.30~0.9	1.2~1.8	0.25	0.1	0.15	-	-	remaining	-			A	A			
Al-Mn	3003	0.05~0.20	0.6	0.7	1.0~1.5	-	0.1	-	-	-	-	remaining	-	H14	140	D	B	Cooking utensils. Chemical equipment.	200 - 2500	0,2
Al-Si	4032	0.5~1.3	11.0~13.5	1	-	0.8~1.3	0.25	0.1	-	-	-	remaining	Ni0.5~1.3	T6	379	B	D	Pistons.	200 - 1000	0,18
Al-Mg	5052	0.1	0.25	0.4	0.1	2.2~2.8	0.1	0.15~0.35	-	-	-	remaining	- H34	H14	260	C	A	Architectural. Cable Sheeting. Welded pressure vessels. Hydraulic tubes.	400 - 3000	0,25
	5056	0.1	0.3	0.4	0.05~0.20	4.5~5.6	0.1	0.05~0.20	-	-	-	remaining	- H32	H12	300	C	A			
	5083	0.1	0.4	0.4	0.4~1.0	4.0~4.9	0.25	0.05~0.25	0.15	-	-	remaining	-	H112	335	C	A	Transportation equipment.		
	5086	0.1	0.4	0.5	0.20~0.7	3.5~4.5	0.25	0.05~0.25	0.15	-	-	remaining	- H116	H32	300	C	A			
Al-Mg-Si	6061	0.15~0.40	0.4~0.8	0.7	0.15	0.8~1.2	0.25	0.04~0.35	0.15	-	-	remaining	-	T6	300	C	B	Heavy duty structure. Furniture. Architectural. Heavy duty welded structure. Pipeline. Heat Sink.	400 - 2500	0,2
	6063	0.1	0.2~0.6	0.35	0.1	0.45~0.9	0.1	0.1	0.1	-	-	remaining	-	T5	200	C	B			
	6070	0.15~0.40	1.0~1.7	0.5	0.40~1.0	0.50~1.2	0.25	0.1	0.15	-	-	remaining	-	T6	379	C	C			
	6151	0.35	0.6~1.2	1	0.2	0.45~0.8	0.25	0.15~0.35	0.15	-	-	remaining	-	T6		C	C			
	6262	0.15~0.40	0.4~0.8	0.7	0.15	0.8~1.2	0.25	0.04~0.14	0.15	0.4	0.7	remaining	-	T9	400	B	B			
	6351	0.1	0.7~1.3	0.5	0.4~0.8	0.40~0.8	0.2	-	0.2	-	-	remaining	-	T6	310	D	C			
	6463	0.2	0.20~0.6	0.15	0.05	0.45~0.9	0.05	-	-	-	-	remaining	-	T6	241	C	B			
Al-Zn	7001	1.6~2.6	0.35	0.4	0.2	2.6~3.4	6.8~8.0	0.18~0.35	0.2	-	-	remaining	-	O		B	A	High strength structure. Aircraft structure. Bat.	400 - 3000	0,25
	7003	0.2	0.3	0.35	0.3	0.50~1.0	5.0~6.5	0.2	0.2	-	-	remaining	Zr0.05~0.25	T5	400	B	A			
	7050	2.0~2.6	0.12	0.15	0.1	1.9~2.6	5.7~6.7	0.04	0.06	-	-	remaining	Zr0.08~0.15	T73	530	B	A			
	7075	1.2~2.0	0.4	0.5	0.3	2.1~2.9	5.1~6.1	0.18~0.28	0.2	-	-	remaining	-	T6	570	B	A			
	7178	1.6~2.4	0.4	0.5	0.3	2.4~3.1	6.3~7.3	0.18~0.35	0.2	-	-	remaining	-	T6	600	B	A			
	7475	1.2~1.9	0.1	0.12	0.06	1.9~2.6	5.2~6.2	0.18~0.25	0.06	-	-	remaining	-	T61	565	B	A			

Machinability

- **A** EXCELLENT
- **B** GOOD-TO-EXCELLENT
- **C** GOOD
- **D** NOT GOOD

$V_C = \pi \times D \times n / 1000$ m/min = mm x RPM

D: Tool diameter, N: RPM, V_C: Cutting speed, $\pi = 3.1416$

Choose a cutting speed in the range of values, compatible with the cutter max rotation capacity (engraved on the body) and your spindle stability.

STELLRAM

Recommendations for High Speed Machining at 8,000 rpm or above.

- Check spindle condition:
  Runout
  Balancing
  Clamping of the attachment in traction
  Marking and cleanliness

- Check that the tool is suitable for the required use.

- Inserts must be locked positively in the pocket and secured using the torx screw provided. The screw must be torqued to the correct value as indicated in our charts on the steel product page 78.

For security use a new screw each time.

- Check the balancing of the – assembled tool – cutter body, inserts and attachment.

- Before start up, note the maximum RPM engraved on the tool or in our technical documents. The maximum RPM is linked to a precise balancing value.

- Ensure that the field of application of the tool shown in our technical documents and technological parameters is observed:

a_e (mm)	width of cut, lateral engagement (radial)
a_p (mm)	Axial depth of cut
f_z (mm/tooth)	Feed per tooth
n (rpm)	RPM

Stellram cannot accept responsibility for misuse of this product:

- Non observance of the above instructions
- Machine without casing
- Incorrect clamping of workpieces
- No safety device on the machine
- Any misuse or incorrect clamping

The optimum rotation must be determined by condition of the spindle. The spindle must be rigid to run at these higher RPMs.

Under no circumstances must any attempt be made to repair this tool. The only permitted maintenance is the indexing or replacement of the inserts. Use a new screw for each insert replacement.

When assembling the cutter to a shrink fit holder, the maximum protrusion can not exceed 10% of the reach of tool.

The Cutter Nomenclature Code:

Example: 5702VZD14CA020R58-2

5702	=	Stellram Product Family
V	=	Screw fixation
Z	=	Insert shape (parallelogram)
D	=	ISO insert clearance (D = 15°)
14	=	Insert edge length (mm)
C	=	Plain straight shank (No flats)
A	=	Through the tool coolant
020	=	Cutting diameter (mm)
R	=	Right hand tool
58	=	Reach of tool in mm
-2	=	Maximum value of the insert radius in 1/10mm increments

This tool must only be used for the following applications: Face milling, shoulder milling, slotting and pocketing.

Cylindrical shanks & HSK shanks (special): 5702VZD14 and 5720VZ16 are designed and balanced to G6.3 at 30,000 rpm for diameters 50mm and below. Diameters larger then 50mm are balanced to G6.3 at 24,000 rpm. Cylindrical shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance by the end user when exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Shell Mills and Modular Heads: 5720VZ16 Shell Mills and Modular Heads are not balanced. These tools must be re-inspected for balance as an assembly, cutter + adapter + inserts + screws by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Balancing requires removing some material by drilling or milling operations. To avoid making modular heads weaker, limit these operations by avoiding high rpm.

For each new modular head added to the same extension, re-balance the assembly. For each new Shell Mill installed on the same toolholder, re-balance the assembly.

Tighten the Modular Head to the Extension, with lubricant, apply the torque value of:

Thread sizes (mm)	Torque Values Nm
M6	10
M8	30
M10	50
M12	80
M16	110

Tighten the bolt between the shell mill and tool holder, with lubricant apply the torque value of:

Thread sizes (mm)	Cutter Bore Size (mm)	Torque Values Nm
M6	13	10
M8	16	30
M10	22	50
M12	27	80
M16	32	110
M20	40	120

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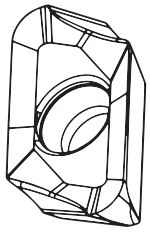
5720 Case History

Material: Aluminium 2024
Cutter: 5720VZ (32mm Cutter)
Component: Seat Support
Industry Segment: Aerospace
Insert Grade: GH1
Spindle Speed: 17,491 RPM
Cutting Speed V_C: 1758 m/min
Feed per Tooth f_Z: 0,25mm
Feed rate: 8745 mm/min
Depth of Cut: 2,5mm

Result: 400% Increase in Productivity

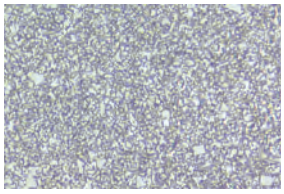
5720 High Speed Geometry



-721 N

This extreme high positive geometry is highly suitable for machining Aluminium Alloys, Copper and Brass. This geometry is periphery ground with a pressed, polished top rake face reducing built up edge. Especially qualified when machining thin-walled components.

High Speed Grade



GH1 N

Uncoated, Micrograin

This micrograin grade is designed for use on Aluminium Alloys, Copper, Brass and Kevlar etc. The grade GH1 works well with or without coolant with low cutting pressure at high speeds due to sharp cutting edge.

Material Guide – Key to Recommended Inserts

Material Designation							
P Unalloyed Steels	P Alloyed Steels	M Stainless Steels	M PH Stainless	K Cast Irons	N Aluminum & Alloys	S High Temp. Alloys	H Hard Materials

5702 High Speed Aluminium Cutters

Outstanding performance in a 20mm cutter

5702 Series High Speed Aluminium Cutters

5702 Up to 43000 RPM
Cylindrical
20mm

Extreme Metal Removal to fit your application

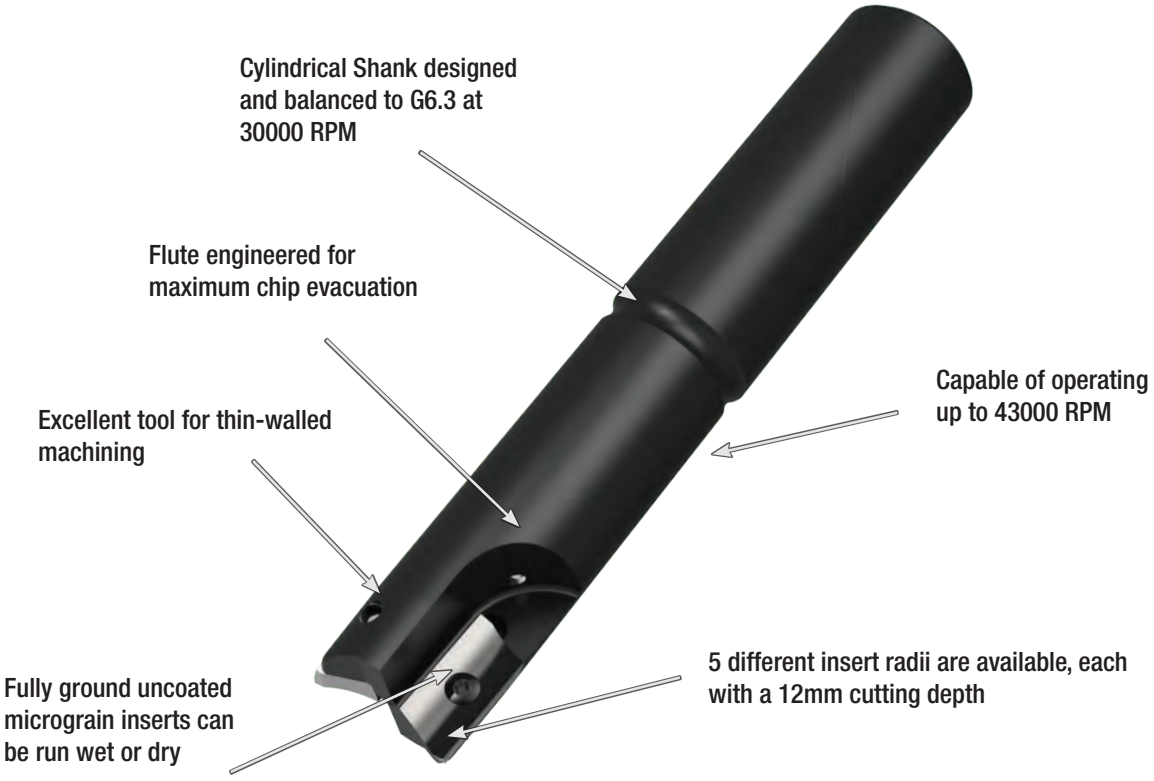
- Especially designed for machining pockets and profiles on Aluminium and Aluminium Alloys
- Desiged, manufactured and tested in accordance with EN ISO 15641:2001 to ensure maximum stability in high speed applications
- Through-tool coolant allowing better chip evacuation and higher feed rates
- Pockets are reinforced to allow for heavy feeding and safe ramping during machining
- Excellent tools for thin-walled machining
- HSK specials available upon request
- 12mm depth of cut
- 5 radii available
- -701 fully ground geometry ideal for high speed Aluminium milling
- Balanced to G6.3 @ 30000 RPM

5702 Case History

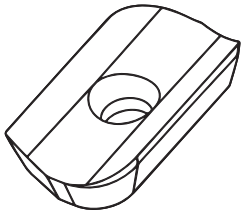
Material: Aluminium Alloy 7175
Component: Airframe
Industry Segment: Aerospace
Tool: 5702VZD (20mm Cutter)
Insert Grade: GH2
Cutting Speed V_C: 754 m/min
Spindle Speed: 12000 RPM
Feed per Tooth f_Z: 0,25mm
Feedrate: 6000 mm/min

Precision inserts provide excellent results in thin-wall machining applications while yielding superior surface finishes

5702 Precision High Speed Aluminium Cutter



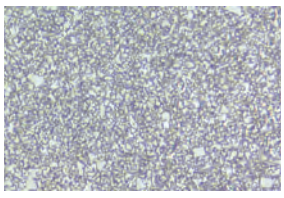
5702 Geometry



-701 N

This extreme high positive geometry is highly suitable for machining Aluminium Alloys, Copper and Brass. The -701 geometry is precision ground and gives excellent performance when machining thin-walled components.

5702 Grade



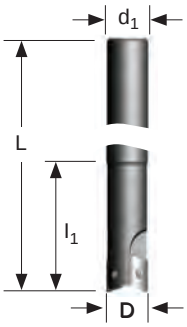
GH1 N

Uncoated, Micrograin

This micrograin grade is designed for use on Aluminium Alloys, Copper, Brass and Kevlar, etc. The grade GH1 works well with or without coolant with low cutting pressure at high speeds due to sharp cutting edge.

Material Guide – Key to Recommended Inserts

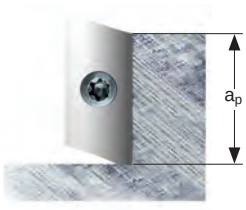
Material Designation							
P Unalloyed Steels	P Alloyed Steels	M Stainless Steels	M PH Stainless	K Cast Irons	N Aluminum & Alloys	S High Temp. Alloys	H Hard Materials



Cylindrical Shank

Product		Dimensions (mm)							Spares				
EDP	Item Description	D	L/H	l_1	d_1	a_p max	No. of Teeth	Insert radius range	*EDP*		*EDP*		Screw Tightening Nm*
5702VZD14 Cylindrical Shank													
028998	5702VZD14CA020R58-2	20	108	58	20	12	2	< 2,00	015060	F2505T	018488	T7	0,80
028999	5702VZD14CA020R58-4	20	108	58	20	12	2	2,50 to 4,00	015060	F2505T	018488	T7	0,80

*** It is important to change the screw each time the insert is changed to ensure the highest security.**
A dynamometric key and the right torque value are important. See above for the correct torque information.

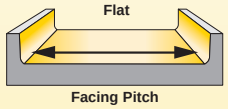


Depth of Cut (ap)

5702VZD Technical Information (mm)

Product		Dimensions					
EDP	Item Description	Facing Pitch	Ramping Angle °	Helical Hole min. - max.		a_p max Helical / Linear	Max RPM
028998	5702VZD14CA020R58-2	20	11.0*	26,8	38,0	3,00	43000
028999	5702VZD14CA020R58-4	20	11.0*	26,8	38,0	3,00	43000

* Max. ramping angle for insert is calculated with facet



Find the different ramping angles for all available insert radii on technical information page 90.

Radial depth of cut 0,20mm up to full cutter diameter.

These tools have been designed, manufactured and tested in accordance with EN ISO standard 15641:2001.

These tools are stocked without an electronic chip.

Note: If using a insert with radius, then the facing pitch for the 5702VZD cutter is equal to the cutting diameter (D) minus 2 x chosen radius.

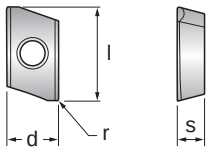
Cylindrical Shanks or Special HSK Integral Shanks are designed and balanced to G6.3 at 30,000 RPM for diameters 50mm and below. Diameters larger then 50mm are balanced to G6.3 at 24,000 rpm.

Cylindrical Shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance as an assembly by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Additional Balancing and Torque values can be found in the technical section pages 91.

STELLRAM

ZDCX14-701



Product			Application & Material			Dimensions (mm)				
			Roughing ▼	Semi-Finishing ▼▼	Finishing ▼▼▼					
EDP	Item Description	Grade	Depth of Cut (mm)			d (IC)	l	s	r	h_m min
			a_p max. 12*	a_p min. - max. 1,00 - 4,00	a_p min. - max. 0,20 - 1,00					
029027	ZDCX1403PDFR-701	GH1	♦	♦	♦	7,59	16,83	3,18	Facet	0,02
029028	ZDCX140320FR-701	GH1	♦	♦	♦	7,59	16,83	3,18	2,0	0,02
026019	ZDCX140325FR-701	GH1	♦	♦	♦	7,59	16,83	3,18	2,5	0,02
029029	ZDCX140330FR-701	GH1	♦	♦	♦	7,59	16,83	3,18	3,0	0,02
026020	ZDCX140340FR-701	GH1	♦	♦	♦	7,59	16,83	3,18	4,0	0,02

Machining Choice: ♦ 1st Choice ■ 2nd Choice ● 3rd Choice | Material Guide Key descriptions found on page 87.

* Max. possible a_p of 12mm and a_e the full diameter (depending on the application).
* For Slotting applications with 5702VZD14 series the maximum a_p is 6mm.

5702VZD Feeds f_z (mm/tooth)

Size	Geometry	Grade	Operation	Aluminium & Alloys <16% Si 116 HBN	Aluminium & Silicon >16% Si 92 HBN
				Min. - Max.	Min. - Max.
14mm	FR-701	GH1	Profile/ Pocketing	0,02 - 0,25	0,02 - 0,20

Speed v_c (m/min)

5702VZD Series			K10-K20/C3 - C2 ISO / ANSI	
			Speed min. - max.	
Coolant Recommendation Recommended ● Possible ◉				Uncoated Micrograin
ISO	Materials	Rm and Hardness		GH1
N	Aluminium & Alloys	Aluminium & Alloys < 16% Si 116 HBN	●	400 - 3050
		Aluminium + Silicon > 16% Si 92 HBN	●	295 - 2440

Calculation of the average chip thickness in relation with the a_e (Radial Engagement) if a_e is less than 50% of Dia.

Formula: Programme Feed Rate (f_z)

$$f_z = h_m \times \sqrt{\frac{d}{a_e}}$$

h_m = Average chip thickness
a_e = Radial engagement
f_z = Feed per tooth
d = Cutter diameter

Formula: Average Chip Thickness (h_m)

$$h_m = f_z \times \sqrt{\frac{a_e}{d}}$$

5702VZD14 Ramp Angle °					
Insert ZDCX1403...FR-701 (Radius mm)					
Cutter dia.	Facet	2,0mm	2,50mm	3,00mm	4,00mm
20mm	11.0	9.8	9.0	8.0	6.3

*For Slotting applications with 5702VZD14 series the maximum a_p is 6mm.

These tools are designed, manufactured, tested and balanced in accordance with EN ISO 15641:2001 for maximum stability in high speed applications.

Metal Removal		
Calculated with 24000 RPM		
Cutter	Z	Qmax - cm^3/min
20	2	720

The chart above shows total metal removal capacity (based on 24,000 RPM) by cutter diameter and number of teeth (2).

The maximum RPM is engraved on all cutter bodies.

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Machinability by Materials (Aluminium)

Alloy Group	Alloy Designation	CHEMICAL COMPOSITION LIMITS (WT%)												Typical tremper	Rm (Mpa)	Machinability Chip formation	Machinability	Typical Applications	v_c m/min min. - max.	f_z mm/Z max.
		Cu	Si	Fe	Mn	Mg	Zn	Cr	Ti	Pb	Bi	Al	Others							
Al	1050	0.05	0.25	0.4	0.5	0.05	0.05	-	-	-	-	99.50min	-	H14	105	D	A	Chemical equipment Sheet metal work Coiled tube	600 - 3000	0,2
	1100	0.05~0.20	Si+Fe1.0max		0.05	-	0.1	-	-	-	-	99.00min	-	H14	90	D	A			
Al-Cu	2011	50.~60.	0.4	0.7	-	-	0.3	-	-	0.2	0.6	remaining	-	T3	310	A	A	Screw machine products. Tuck frame. Aircraft structure. Jet engine impellers. Aircraft engine cylinder heads.	400 - 2500	0,25
	2014	3.9~5.0	0.5~1.2	0.7	0.4~1.2	0.2~0.8	0.25	0.1	0.15	-	-	remaining	-	T6	430	B	A			
	2017	3.5~4.5	0.2~0.8	0.7	0.4~1.0	0.4~0.8	0.25	0.1	0.15	-	-	remaining	-	T4	390	B	A			
	2024	3.8~4.9	0.5	0.5	0.3~0.9	1.2~1.8	0.25	0.1	0.15	-	-	remaining	-	T4	465	B	A			
	2218	3.5~4.5	0.9	1	0.2	1.2~1.8	0.25	0.1	-	-	-	remaining	Ni1.7~2.3	T72	331	B	B			
	2224	3.8~4.4	0.12	0.15	0.30~0.9	1.2~1.8	0.25	0.1	0.15	-	-	remaining	-			A	A			
Al-Mn	3003	0.05~0.20	0.6	0.7	1.0~1.5	-	0.1	-	-	-	-	remaining	-	H14	140	D	B	Cooking utensils. Chemical equipment.	200 - 2500	0,2
Al-Si	4032	0.5~1.3	11.0~13.5	1	-	0.8~1.3	0.25	0.1	-	-	-	remaining	Ni0.5~1.3	T6	379	B	D	Pistons.	200 - 1000	0,18
Al-Mg	5052	0.1	0.25	0.4	0.1	2.2~2.8	0.1	0.15~0.35	-	-	-	remaining	- H34	H14	260	C	A	Architectural. Cable Sheeting. Welded pressure vessels. Hydraulic tubes.	400 - 3000	0,25
	5056	0.1	0.3	0.4	0.05~0.20	4.5~5.6	0.1	0.05~0.20	-	-	-	remaining	- H32	H12	300	C	A			
	5083	0.1	0.4	0.4	0.4~1.0	4.0~4.9	0.25	0.05~0.25	0.15	-	-	remaining	-	H112	335	C	A	Transportation equipment.		
	5086	0.1	0.4	0.5	0.20~0.7	3.5~4.5	0.25	0.05~0.25	0.15	-	-	remaining	- H116	H32	300	C	A			
Al-Mg-Si	6061	0.15~0.40	0.4~0.8	0.7	0.15	0.8~1.2	0.25	0.04~0.35	0.15	-	-	remaining	-	T6	300	C	B	Heavy duty structure. Furniture. Architectural. Heavy duty welded structure. Pipeline. Heat Sink.	400 - 2500	0,2
	6063	0.1	0.2~0.6	0.35	0.1	0.45~0.9	0.1	0.1	0.1	-	-	remaining	-	T5	200	C	B			
	6070	0.15~0.40	1.0~1.7	0.5	0.40~1.0	0.50~1.2	0.25	0.1	0.15	-	-	remaining	-	T6	379	C	C			
	6151	0.35	0.6~1.2	1	0.2	0.45~0.8	0.25	0.15~0.35	0.15	-	-	remaining	-	T6		C	C			
	6262	0.15~0.40	0.4~0.8	0.7	0.15	0.8~1.2	0.25	0.04~0.14	0.15	0.4	0.7	remaining	-	T9	400	B	B			
	6351	0.1	0.7~1.3	0.5	0.4~0.8	0.40~0.8	0.2	-	0.2	-	-	remaining	-	T6	310	D	C			
	6463	0.2	0.20~0.6	0.15	0.05	0.45~0.9	0.05	-	-	-	-	remaining	-	T6	241	C	B			
Al-Zn	7001	1.6~2.6	0.35	0.4	0.2	2.6~3.4	6.8~8.0	0.18~0.35	0.2	-	-	remaining	-	O		B	A	High strength structure. Aircraft structure. Bat.	400 - 3000	0,25
	7003	0.2	0.3	0.35	0.3	0.50~1.0	5.0~6.5	0.2	0.2	-	-	remaining	Zr0.05~0.25	T5	400	B	A			
	7050	2.0~2.6	0.12	0.15	0.1	1.9~2.6	5.7~6.7	0.04	0.06	-	-	remaining	Zr0.08~0.15	T73	530	B	A			
	7075	1.2~2.0	0.4	0.5	0.3	2.1~2.9	5.1~6.1	0.18~0.28	0.2	-	-	remaining	-	T6	570	B	A			
	7178	1.6~2.4	0.4	0.5	0.3	2.4~3.1	6.3~7.3	0.18~0.35	0.2	-	-	remaining	-	T6	600	B	A			
	7475	1.2~1.9	0.1	0.12	0.06	1.9~2.6	5.2~6.2	0.18~0.25	0.06	-	-	remaining	-	T61	565	B	A			

Machinability

- **A** EXCELLENT
- **B** GOOD-TO-EXCELLENT
- **C** GOOD
- **D** NOT GOOD

$V_C = \pi \times D \times n / 1000$ m/min = mm x RPM

D: Tool diameter, N: RPM, V_C: Cutting speed, $\pi = 3.1416$

Choose a cutting speed in the range of values, compatible with the cutter max rotation capacity (engraved on the body) and your spindle stability.

Recommendations for High Speed Machining at 8,000 rpm or above.

- Check spindle condition:
  Runout
  Balancing
  Clamping of the attachment in traction
  Marking and cleanliness
- Check that the tool is suitable for the required use.
- Inserts must be locked positively in the pocket and secured using the torx screw provided. The screw must be torqued to the correct value as indicated in our charts on the steel product page 88. For security use a new screw each time.
- Check the balancing of the – assembled tool – cutter body, inserts and attachment.
- Before start up, note the maximum RPM engraved on the tool or in our technical documents. The maximum RPM is linked to a precise balancing value.
- Ensure that the field of application of the tool shown in our technical documents and technological parameters is observed:

a_e (mm)	width of cut, lateral engagement (radial)
a_p (mm)	Axial depth of cut
f_z (mm/tooth)	Feed per tooth
n (rpm)	RPM

Stellram cannot accept responsibility for misuse of this product:

- Non observance of the above instructions
- Machine without casing
- Incorrect clamping of workpieces
- No safety device on the machine
- Any misuse or incorrect clamping

The optimum rotation must be determined by condition of the spindle. The spindle must be rigid to run at these higher RPMs.

Under no circumstances must any attempt be made to repair this tool. The only permitted maintenance is the indexing or replacement of the inserts. Use a new screw for each insert replacement.

When assembling the cutter to a shrink fit holder, the maximum protrusion can not exceed 10% of the reach of tool.

The Cutter Nomenclature Code:

Example: 5702VZD14CA020R58-2

5702	=	Stellram Product Family
V	=	Screw fixation
Z	=	Insert shape (parallelogram)
D	=	ISO insert clearance (D = 15°)
14	=	Insert edge length (mm)
C	=	Plain straight shank (No flats)
A	=	Through the tool coolant
020	=	Cutting diameter (mm)
R	=	Right hand tool
58	=	Reach of tool in mm
-2	=	Maximum value of the insert radius in 1/10mm increments

This tool must only be used for the following applications: Face milling, shoulder milling, slotting and pocketing.

Cylindrical shanks & HSK shanks (special): 5702VZD14 and 5720VZ16 are designed and balanced to G6.3 at 30,000 rpm for diameters 50mm and below. Diameters larger then 50mm are balanced to G6.3 at 24,000 rpm. Cylindrical shank tools mounted in a shrink fit holder or any other mill chuck holder + inserts + screws must be re-inspected for balance by the end user when exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Shell Mills and Modular Heads: 5720VZ16 Shell Mills and Modular Heads are not balanced. These tools must be re-inspected for balance as an assembly, cutter + adapter + inserts + screws by the end user when at or exceeding 8,000 rpm. End user must balance the assembly to a G6.3 value minimum.

Balancing requires removing some material by drilling or milling operations. To avoid making modular heads weaker, limit these operations by avoiding high rpm.

For each new modular head added to the same extension, re-balance the assembly. For each new Shell Mill installed on the same toolholder, re-balance the assembly.

Tighten the Modular Head to the Extension, with lubricant, apply the torque value of:

Thread sizes (mm)	Torque Values Nm
M6	10
M8	30
M10	50
M12	80
M16	110

Tighten the bolt between the shell mill and tool holder, with lubricant apply the torque value of:

Thread sizes (mm)	Cutter Bore Size (mm)	Torque Values Nm
M6	13	10
M8	16	30
M10	22	50
M12	27	80
M16	32	110
M20	40	120

Metalcutting Safety

IMPORTANT SAFETY INSTRUCTIONS
Read before using the tools in this catalog!
Projectile and Fragmentation Hazards:

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards:
Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes and may make existing skin conditions worse.

To avoid injury:

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by Kennametal and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalog and recommendations on machining practices may not apply to your particular operation. For more information, consult Kennametal's Metalcutting Safety booklet, available free from Kennametal at 724.539.5747 or fax 724.539.5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at 724.539.5066 or fax 724.539.5372.

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