TOOLING SYSTEMS PROCESS OPTIMIZATION CONSULTING IN MILLING STRATEGIES

SPINWORX®

AND YET IT MOVES

Galileo Galilei

pokolm voha

PREMIUMTOOLS. WE KNOW HOW.

THE ROTATING INSERT

SPINWORX® – the new system of milling cutters with round inserts puts into question, which has been an effective operation for decades: the insert has to be rigidly coupled to the cutter body. In case it would be loose in its insert-seat, it would break, earlier or later! Not at all with SPINWORX® – the insert rotates and thus, manuel re-location becomes redundant. Through the rotating insert in the seat of the milling cutter, notch wear is not occuring any more; so you get a 100%-utilization of the existing cutting edge and you are able to use maximum capacity without any loss. SPINWORX® sets new standards: reducing your downtimes and nonproductive times to zero. Enable yourself by using our SPINWORX®-system to most efficient machining of your components and increase your machining capacity considerably. We offer our SPINWORX®-tools as threaded shank end mill bodies and shell-type milling cutters, as well as with our patent protected DuoPlug®-connection for highest concentricity and maximum rigidity.

Besides those already mentioned advantages of extremely reduced insert wear and extended tool life, this system has further positive effects: According to the cutting conditions, a reduced chip compression leads to power consumption. This again effects increased protection of the machine spindle. And it leads to quiet running and reduction of noise emissions. Like for our range of conventional inserts, the extent of cutter diameters for the **SPINWORX®**-System starts at 25 mm and ends up with 200 mm diameter and a modification of your nc-programs is redundant.

MISJUGDEMENTS OF HISTORY:

+++„Horses will survive for ever, however motor vehicles are only a temporarily fashion.“+++
(The president of the Michigan Savings Bank 1903)

+++„The worldwide demand for motor vehicles is not going to exceed one million pieces...“+++
(Gottlieb Daimler, inventor, 1901)

+++„I believe, there is a need on the global market for only 5 computers.“+++
(Thomas J. Watson Senior, Head of IBM)

+++„This wall will persist for the next 50 as well as 100 years,...“+++
(Erich Honecker, Chairman of the Council of State of GDR, Januar 1989)

+++“Inserts have to be rigidly coupled with the cutter body!”+++

YOU PROFIT FROM THIS SUMMARY OF ADVANTAGES:

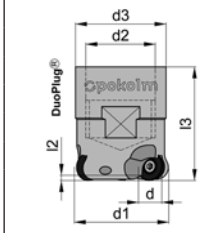
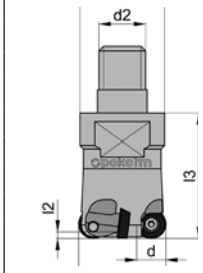
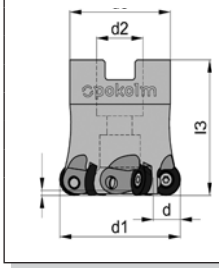
- 100 % usage of the total insert periphery
- fourfold increase in tool life*
- a four times higher chip volume is possible through un-interrupted production processes*
- substantial reduced downtimes of your machines: no manual re-locating of inserts is necessary
- obviously decreased chip compression leads to a reduction of power consumption and beyond that, protects your machine spindle

*according to cutting conditions

CONTENT

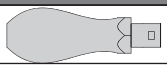
DIMENSIONS AND OPERATION DATA

Spinworx® - radius 5 mm

MILLING CUTTER BODIES	Catalogue No.	d_1	d	r	d_2	d_3	l_2	l_3	z	
Duo Plug®										
	3 25 200/7 SG DR	25	10	5	M 16	23,5	2,5	35	3	
Threaded shank end mill bodies										
	3 25 200/7 DR	25	10	5	M 12	21	2,5	32,5	3	
	5 35 200/7 DR	35	10	5	M 16	29	2,5	43	5	
Shell type milling cutter bodies										
	7 52 310/7 DR	52	10	5	22	40	2,5	52,5	7	

Thread stud bolt supports have left hand Thread!

Accessories

ACCESSORIES	Catalogue No.	Description	Dimensions			
	TV 1-5	screwdriver torque Vario®-S with window scale	NM 1,0 - 5,0	with scale		
	T8 500	Torx-interchangeable bit	T 8	L175	max. 1,3 Nm	
	T8 502	Torx magicspring interchangeable blade	T8	L175	max. 1,3 Nm	

Clamping torque for torx size T8 M_d: 1,0 Nm

Spinworx®-inserts

INDEXABLE INSERTS	Catalogue No.	DIN-Identification	kind for material	kind of chips	d	r	
	02 10 8A0 DR	ROHX10	steel/cast iron	short-chipping	10	5	
	02 10 8B0 DR	ROHX10	steel	long-chipping	10	5	

Inserts and pins only available as kits. Threaded stud bolt supports have left hand thread!

Cutting Speeds V_c in m/min

MATERIAL		d	r	kind of machining	*8A0 DR	*8B0 DR
Steel		10	5	roughing finishing	100 – 300 150 – 350	100 – 300 150 – 350
Cast Iron		10	5	roughing finishing	120 – 220 150 – 250	

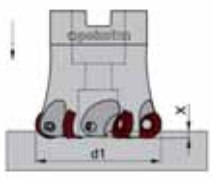
Application data (f_z/a_p)

MATERIAL		d	r	machining rates	*8A0 DR	*8B0 DR
Steel		10	5	f_z (mm) a_p (mm)	0,15 – 0,7 0,1 – 1,0	0,2 – 0,7 0,2 – 1,5
Cast Iron		10	5	f_z (mm) a_p (mm)	0,15 – 0,7 0,1 – 1,0	

These speed and feed values are approximate.

Extended operation data

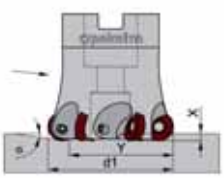
axial plunging into solid block



Cutter diam. ø $d_1$mm	x max. mm
25	2,5
35	2,5
52	2,5

x maximum plunge depth
f_z see operation data table, but reduce value to 30%

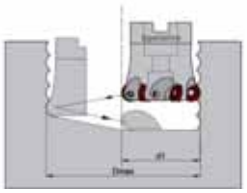
ramping



a°	y mm
< 19,7	7
< 8,4	17
< 4,2	34

y minimum travel
a_p/f_z see operation data table

circular milling into solid block

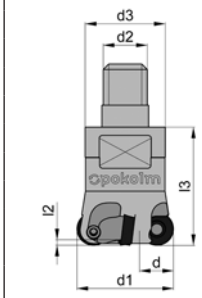
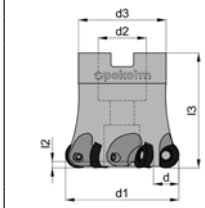


D_{min} mm	D_{max} mm
32	50
52	70
86	104

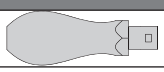
D_{min} minimum bore diameter depending on cutter diameter
D_{max} maximum bore diameter depending on cutter diameter

DIMENSIONS AND OPERATION DATA

Spinworx® - radius 6 mm

MILLING CUTTER BODIES	Catalogue No.	d_1	d	r	d_2	d_3	l_2	l_3	z	
Threaded shank end mill bodies										
	4 35 200/7 DR	35	12	6	M 16	29	3	42,5	4	
Shell type milling cutter bodies										
	6 52 310/7 DR	52	12	6	22	40	3,5	52,5	6	
	7 66 310/7 DR	66	12	6	27	48	3,5	52,5	7	

Accessories

ACCESSORIES	Catalogue No.	Description	Dimensions			
	TV 1-5	screwdriver torque Vario®-S with window scale	Nm 1,0 - 5,0	with scale		
	T10 500	Torx-interchangeable bit	T 10	L 175	max. 3,8 Nm	
	T10 502	Torx magicspring interchangeable blade	T 10	L 175	max. 3,8 Nm	

Clamping torque for torx size T10 M_d: 1,4 Nm

Spinworx®-inserts

INDEXABLE INSERTS	Catalogue No.	DIN-Identification	kind for material	kind of chips	d	r
	03 12 8A0 DR	ROHX12	steel/cast iron	short-chipping	12	6
	03 12 8B0 DR	ROHX12	steel	long-chipping	12	6

Inserts and pins only available as kits.

Cutting Speeds V_c in m/min

MATERIAL		d	r	kind of machining	*8A0 DR	*8B0 DR
Steel		12	6	roughing finishing	100 – 300 150 – 350	100 – 300 150 – 350
Cast Iron		12	6	roughing finishing	120 –220 180 – 300	

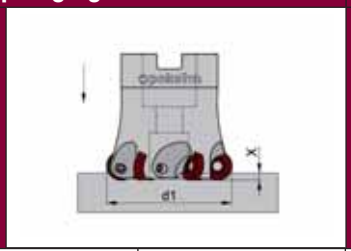
Application data (f_z/a_p)

MATERIAL		d	r	Machining rates	*8A0 DR	*8B0 DR
Steel		12	6	f_z (mm) a_p (mm)	0,15 - 0,8 0,1 - 1,5	0,2 – 0,8 0,2 – 2,0
Cast Iron		12	6	f_z (mm) a_p (mm)	0,15 - 0,8 0,1 - 1,5	

These speed and feed values are approximate.

Extended operation data

axial plunging into solid block

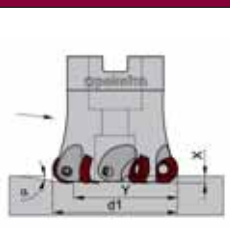


Cutter diam ø $d_1$mm	x max. mm
35	3
52	3,5
66	3,5

x maximum plunge depth

f_z see operation data table, but reduce value to 30%

ramping

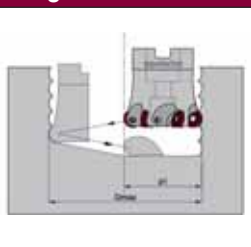


a°	y mm
< 13	13
<5,7	30
< 3,9	44

y minimum travel

a_p/f_z see operation data table

circular milling into solid block



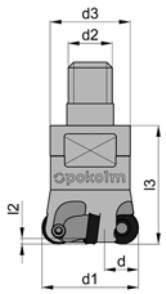
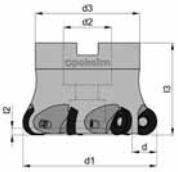
D_{min} mm	D_{max} mm
46	70
82	104
110	132

D_{min} minimum bore diameter depending on cutter diameter

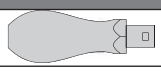
D_{max} maximum bore diameter depending on cutter diameter

DIMENSIONS AND OPERATION DATA

Spinworx® - radius 8 mm

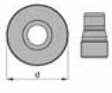
MILLING CUTTER BODIES	Catalogue No.	d_1	d	r	d_2	d_3	l_2	l_3	z	
Threaded shank end mill bodies										
	3 35 201/7 DR	35	16	8	M16	29	4	43,5	3	
Shell type milling cutter bodies										
	4 52 300/7 DR	52	16	8	22	40	3,8	53	4	
	5 52 300/7 DR	52	16	8	22	40	3,8	53	5	
	6 66 300/7 DR	66	16	8	27	48	3,8	53	6	
	8 80 300/7 DR	80	16	8	27	60	3,8	53	8	
	7 100 300/7 DR	100	16	8	32	70	4,8	53	7	
	9 100 300/7 DR	100	16	8	32	70	4,8	53	9	

Accessories

ACCESSORIES	Catalogue No.	Description	Dimensions			
	TV 1-5	screwdriver torque Vario®-S with window scale	Nm 1,0 - 5,0	with scale		
	T15 500	Torx-interchangeable bit	T 15	L 175	max. 5,5 Nm	
	T15 502	Torx magicspring interchangeable blade	T15	L 175	max. 5,5 Nm	

Clamping torque for torx size T15 M_d: 1,8 Nm

Spinworx®-inserts

INDEXABLE INSERTS	Catalogue-No.	DIN-Identification	kind for material	kind of chips	d	r	
	04 16 8A0 DR	ROHX16	Steel/Cast Iron	short-chipping	16	8	
	04 16 8B0 DR	ROHX16	Steel	long-chipping	16	8	

Inserts and pins only available as kits.

Cutting Speeds V_c in m/min

MATERIAL		d	r	kind of machining	*8A0 DR	*8B0 DR
Steel		16	8	roughing finishing	100 – 300 150 – 350	100 – 300 150 – 350
Cast Iron		16	8	roughing finishing	120 – 220 150 – 250	

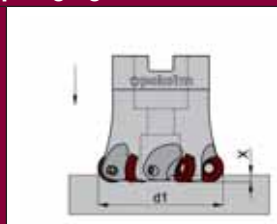
Application data (f_z/a_p)

MATERIAL		d	r	machining rates	*8A0 DR	*8B0 DR
Steel		16	8	f_z (mm) a_p (mm)	0,2 - 0,5 0,2 - 3,0	0,25 – 1,0 0,2 – 3,0
Cast Iron		16	8	f_z (mm) a_p (mm)	0,2 - 0,5 0,2 - 3,0	

These speed and feed values are approximate.

Extended Operation Data

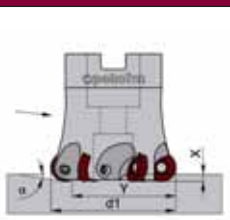
axial plunging into solid block



Cutter diam ø d_1 mm	x max. mm
35	4
52	3,8
66	3,8
80	3,8
100	4,8

x maximum plunge depth
f_z see operation data table, but reduce value to 30%

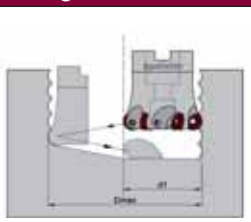
ramping



a°	y mm
< 38,7	5
< 10,3	22
< 6,4	36
< 4,6	50
< 3,3	70

y minimum travel
a_p/f_z see operation data table

circular milling into solid block

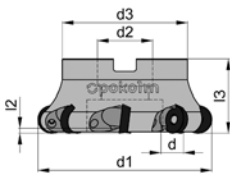


D_{min} mm	D_{max} mm
40	70
74	104
102	132
130	160
170	200

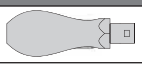
D_{min} minimum bore diameter depending on cutter diameter
D_{max} maximum bore diameter depending on cutter diameter

DIMENSIONS AND OPERATION DATA

Spinworx® - radius 10 mm

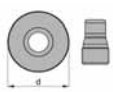
MILLING CUTTER BODIES	Catalogue No.	d_1	d	r	d_2	d_3	l_2	l_3	z	
Shell type milling cutter bodies										
	7 100 340/7 DR	100	20	10	32	70	5,5	53	7	
	8 125 340/7 DR	125	20	10	40	90	5,5	53	8	
	10 160 340/7 DR	160	20	10	40	120	5,5	53	10	
	12 200 340/7 DR	200	20	10	60	160	7	58	12	

Accessories

ACCESSORIES	Catalogue No.	Description	Dimensions			
	TV 1-5	screwdriver torque Vario®-S with window scale	Nm 1,0 - 5,0	with scale		
	T20 500	Torx-interchangeable bit	T 20	L 175	max. 8,0 Nm	
	T20 502	Torx magicspring interchangeable blade	T 20	L 175	max. 8,0 Nm	

Clamping torque for torx size T20 M_d: 2,5 Nm

Spinworx®-inserts

INDEXABLE INSERTS	Catalogue No.	DIN-Identification	kind for material	kind of chips	d	r	
	06 20 8A0 DR	ROHX20	Steel/Cast Iron	short-chipping	20	10	

Inserts and pins only available as kits.

Cutting Speeds V_c in m/min

MATERIAL		d	r	kind of machining	*8A0 DR
Steel		20	10	roughing finishing	100 – 300 150 – 350
Cast Iron		20	10	roughing finishing	120 – 220 160 – 250

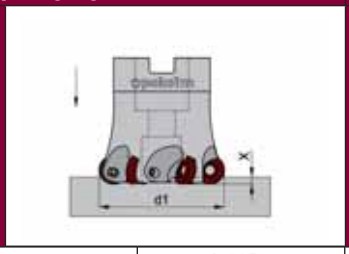
Application data (f_z/a_p)

MATERIAL		d	r	machining rates	*8A0 DR
Steel		20	10	f_z (mm) a_p (mm)	0,25 – 0,6 0,2 – 4,0
Cast Iron		20	10	f_z (mm) a_p (mm)	0,25 – 0,6 0,2 – 4,0

These speed and feed values are approximate.

Extended operation data

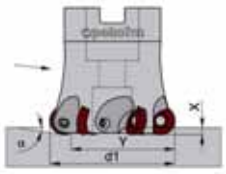
axial plunging into solid block



Cutter diam. ø d_1 mm	x max. mm
100	5,5
125	5,5
160	5,5
200	7

x maximum plunge depth
f_z see operation data table, but reduce value to 30%

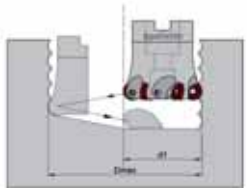
ramping



a°	y mm
< 4,6	62
< 3,3	87
< 2,3	122
< 2	162

y minimum travel
a_p/f_z see operation data table

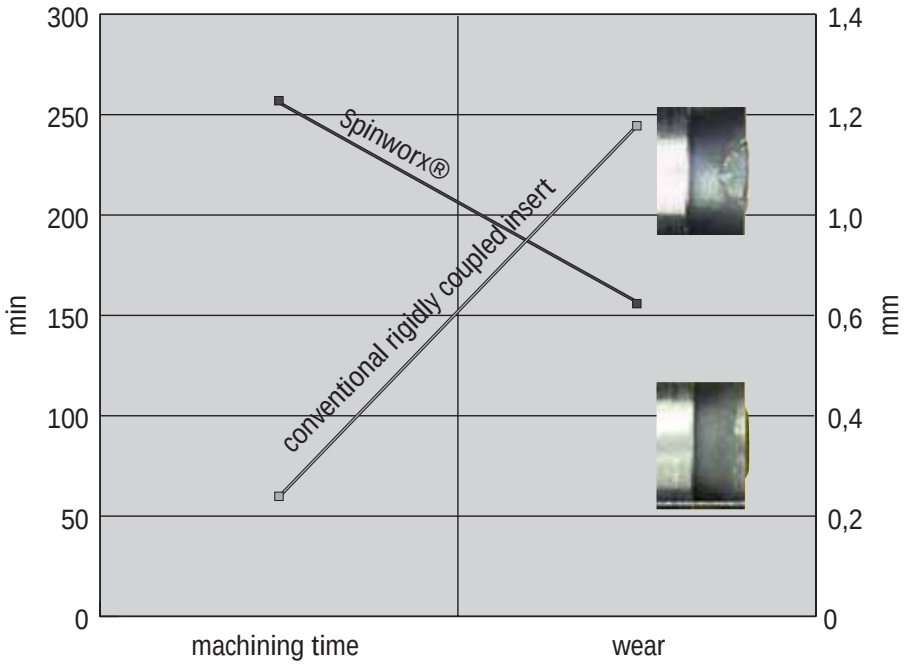
circular milling into solid block



D_{min} mm	D_{max} mm
162	200
212	250
282	320
362	400

D_{min} minimum bore diameter depending on cutter diameter
D_{max} maximum bore diameter depending on cutter diameter

COMPARISON



machining time

After a machining time of 265 minutes, we have identified a wear land of 0.63 mm for our Spinworx®-inserts. The end of cutting-edge life was still far away.

The conventional rigidly coupled insert showed a wear land of 1.17 mm after only 60 minutes (1 side of insert). This was the end of insert life.

FROM PRACTICE TO PRACTICE

Hermesmeyer & Greweling, Marienfeld:

Hermesmeyer & Greweling from the town of Marienfeld near Gütersloh has a lot of professional knowing in milling operations. Founded in 1982 from Hubert Hermesmeyer and Herman Greweling, the company is well known for its expertise in milling strategies for mechanical and plant engineering, mould- and tool-making as well as machine building. High-performance software and an integrated cross-linked machinery of NC- and highspeed machines of well-known manufacturers guarantee flexibility and prime quality without compromises.

Also, todays managing directors Klaus Hermesmeyer and Klaus Greweling are not compromising in selecting their tooling. As one of the first, they were trying our new system Spinworx®. In substantial tests, this new Pokolm-innovation with automatically revolving inserts, had to proove its advantages and abilities. Klaus Greweling: „At first, the idea of an insert revolving around a threaded stud-bolt support created a lot of scepticism. The tests, however, resulted in prooving, that this technology is operating efficiently and is very benificial in certain materials."

FROM PRACTICE TO PRACTICE

JOB TITLE:

This test is related to an order of the automotive industry, where precision, accuracy and the time factor are most important.
The initial component was a 1.7131-steel blank. The requirement has been: milling a trimming tool for the side-wall of a tank cap-insert. The final finishing operation should take place after assembling this item to the moulding tool. Target was, to machine this blank completely to a finished part in only very few machining hours, preferably unattended.
For the test-run, our senior partner Franz-Josef Pokolm took a Spinworx® milling cutter body 6 52 310/7DR 52 mm diam. r6, with 12 mm diam. inserts. The milling machine available was a DMU 200 P with an output of 42 kW and a tool-holder system of SK50. The demanded two-sided-milling operation required a reset of the machine. The blank was machined from top of the bottom and from outside to inside at a time.

MACHINE	MATERIAL
Deckel Maho DMU 200 P	1.7131

Milling the blank-geometry was the main load of this job. This milling process took 114 minutes with a feed rate of 4.500 mm/min and a cutting depth of 1.25 mm. For the bottom part, the machine needed further 58 minutes. The milling machine operator Karl-Wilhelm Dangberg was very satisfied with this result: „The finished part could be integrated immediately into the trimming tool. Certainly, the time-saving through avoiding re-locating of inserts is a substantial argument for Spinworx®. But, more significant to me as a machine operator is the unbelievable higher process reliability“

EXAMPLE FROM PRACTICE:

component:	tank cap-insert
material:	1.7131
arbor:	100 22 710 (22 mm diam., SK 50; DIN 69 871 A)
cutter body:	6 52 310/7 DR (52 mm diam., r6)
insert:	03 12 8A0 DR, (12 mm diam.)
overhang:	155 mm
coolant:	air through spindle
v_c (speed.):	250 m/min
v_f (feed rate):	4500 mm/min
S (revolutions):	1530 1/min
f_z (feed per tooth):	0.49 mm
a_p (depth of cut):	1.25 mm
a_e (width of cut):	38 mm
machining time:	1. side 114 min 2. side 58 min

RESULT:

Franz-Josef Pokolm has carefully examined the Spinworx®-inserts. The result: After a total machining time of 172 minutes, there was practically no wear at all, even with 30 times magnification. You could easily continue to use these inserts for further operations.
Conclusion: With the tool system Spinworx® from Pokolm, extremely short machining times and at the same time, minimized tool costs can be achieved. Further advantages are: - optimized process reliability, unattended machining and , apart from the reset of the machine for top- and bottom-machining, no downtimes. Result: Extensive reduced component costs and a distinct time saving.

SPINWORX®

PV-F-SP-E 1009

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