

Your technology partner for cost-effective machining

OptiMill<sup>®</sup>-Alu-Wave

# OptiMill®-Alu-Wave

## A new dimension of high-volume aluminium machining

The OptiMill-Alu-Wave is a newly developed roughing cutter for machining aluminium materials. It produces short chips and ensures smooth cutting behaviour thanks to its unique cord roughing geometry. The milling cutter has a central cooling channel that minimises the formation of built-up edges and safely removes chips. It also offers configurable corner radii for precise near-contour roughing.

Due to its high machining volume, the OptiMill-Alu-Wave allows efficient material removal and, in this way, increases productivity. Available in various lengths, it adapts perfectly to the individual requirements of any roughing task.

### 1 Highly polished chip spaces

- Reduced adhesion tendencies

### 2 Innovative cord roughing profile

- Targeted chip formation
- Short chips

### 3 Unequal spacing

- Extremely quiet running
- Softer cutting behaviour

### 4 Central cooling channel

- Process-reliable chip removal



## Features

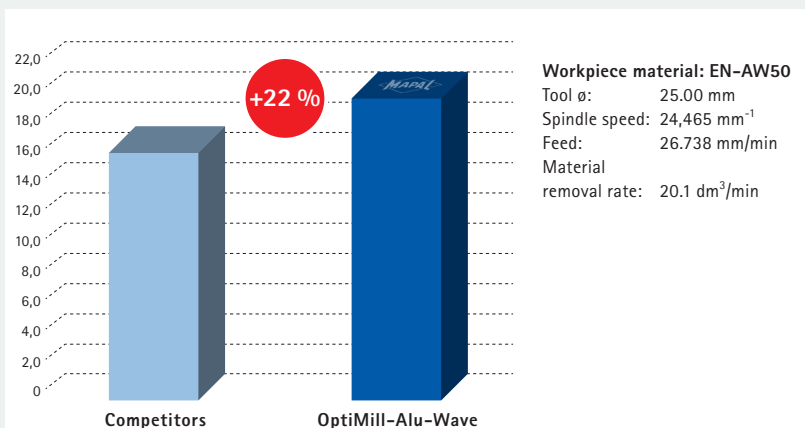
### Preferred series available from stock

- Versions: long, overlong, extra long cantilever length with neck
- Ø area: 12.00 – 25.00 mm
- Shank form: HA

### Configurable features:

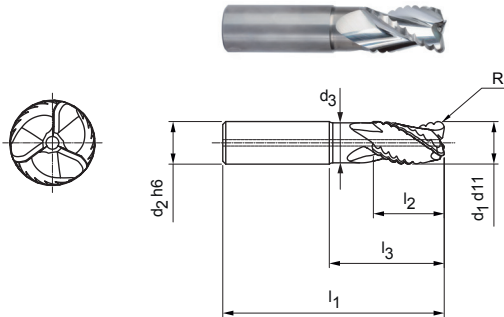
- Ø area: 12.00 – 25.00 mm
- Shank form: HB | SL (Safe-lock®)
- Cutting edge design: Radius | Chamfer 45° of Ø 12.00 – 25.00 mm | 0.40 – 1.00 mm
- Coating: Available as DLC coating with cutting material HP910

## MATERIAL REMOVAL RATE [dm<sup>3</sup>/min]

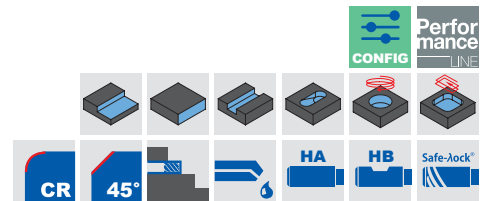


# OptiMill®-Alu-Wave

Shoulder milling cutter, long projection length with neck, with internal coolant supply  
SCM109



N	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	4.1	4.2	4.3	C	1.1	1.2	1.3	2.1	3.1	4.1	4.2	5.1	5.2	5.3
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## Preferred series available from stock | Long projection length

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	R			
12,00	12	11,2	83	22	36	2,00	3	SCM109-1200Z03R-R0200HA-HU318	31430821
16,00	16	15,1	92	26	42	3,00	3	SCM109-1600Z03R-R0300HA-HU318	31430824
20,00	20	18,8	104	32	54	3,00	3	SCM109-2000Z03R-R0300HA-HU318	31430827
20,00	20	18,8	104	32	54	4,00	3	SCM109-2000Z03R-R0400HA-HU318	31430828
25,00	25	23,5	114	40	58	3,00	3	SCM109-2500Z03R-R0300HA-HU318	31430833
25,00	25	23,5	114	40	58	4,00	3	SCM109-2500Z03R-R0400HA-HU318	31430834

## Configurable features

**Shank form:**  
Shank form: HB | SL (Safe-lock®) | MQ (shank HA with MQL\*)

**Cutting edge design:**  
Radius R: 0.40 - 6.50 mm  
Chamfer Cx45°: 0.40 - 1.00 mm

**Coating:**  
Available as DLC coating with cutting material HP910

**Specification:**  
SCM109-2500Z03R-[cutting edge design][shank form]-[coating]

## Dimensions of configurable radii and corner chamfers

d1	Radius R		Chamfer Cx45°	
	R min.	R max.	Cx45° min.	Cx45° max.
12,00	0,40	3,00	0,40	1,00
16,00	0,50	4,00	0,40	1,00
20,00	0,60	5,20	0,40	1,00
25,00	0,75	6,50	0,40	1,00

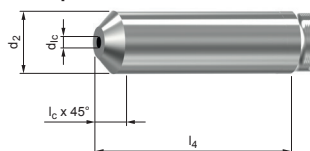
**Example:**  
SCM109-2500Z03R-R0150 SL-HP910



## Safe-lock® by HAIMER

Manufacturer's ID number: 6272

## Example: Shank form MQ (shank with MQL)



Dimensions in mm.  
MQL-Shank design according to DIN 69090-3.

## MQL-Shank design according to DIN69090-3

d2 (h6)	12	16	20	25
l4 (0 / +2)	45	48	50	56
lc (0 / +0,1)	1,7	2,4	3,2	3,7
d1c	2,0	3,0	3,0	4,0

For cutting data recommendation, see pages 6/7.  
Special designs and other coatings available upon request.

# OptiMill®-Alu-Wave

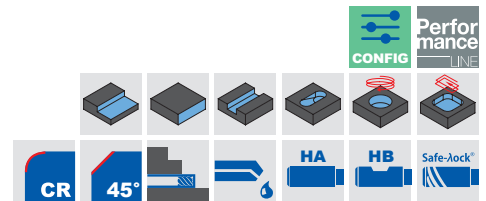
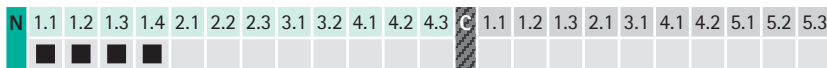
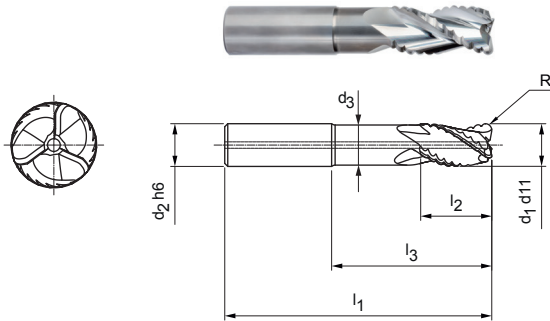
Shoulder milling cutter, overlong projection length with neck, with internal coolant supply SCM109

**Design:**

Diameter of milling cutter: 12.00 - 25.00 mm  
 Cutting material: HU318  
 Number of cutting edges: 3  
 Helix angle: 36°

**Application:**

Before using in the machine, check the cutting data according to machine performance (see cutting data).



Preferred series available from stock | Overlong projection length

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	R			
12,00	12	11,2	95	26	50	2,00	3	SCM109-1200Z03R-R0200HA-HU318	31430822
16,00	16	15,1	115	32	65	3,00	3	SCM109-1600Z03R-R0300HA-HU318	31430825
20,00	20	18,8	125	32	75	3,00	3	SCM109-2000Z03R-R0300HA-HU318	31430829
20,00	20	18,8	125	32	75	4,00	3	SCM109-2000Z03R-R0400HA-HU318	31430830
25,00	25	23,5	136	50	80	3,00	3	SCM109-2500Z03R-R0300HA-HU318	31430835
25,00	25	23,5	136	50	80	4,00	3	SCM109-2500Z03R-R0400HA-HU318	31430836

Configurable features

**Shank form:**  
Shank form: HB | SL (Safe-lock®) | MQ (shank HA with MQL\*)

**Cutting edge design:**  
Radius R: 0.40 - 6.50 mm  
Chamfer Cx45°: 0.40 - 1.00 mm

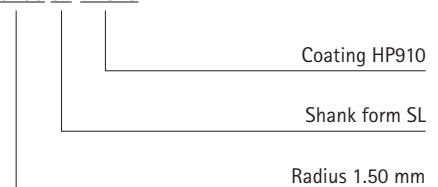
**Coating:**  
Available as DLC coating with cutting material HP910

**Specification:**  
SCM109-2500Z03R-[cutting edge design][shank form]-[coating]

Dimensions of configurable radii and corner chamfers

d1	Radius R		Chamfer Cx45°	
	R min.	R max.	Cx45° min.	Cx45° max.
12,00	0,40	3,00	0,40	1,00
16,00	0,50	4,00	0,40	1,00
20,00	0,60	5,20	0,40	1,00
25,00	0,75	6,50	0,40	1,00

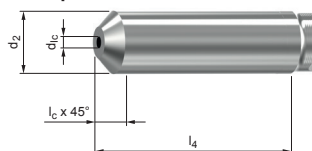
Example:  
SCM109-2500Z03R-R0150 SL-HP910



Safe-lock® by HAIMER

Manufacturer's ID number: 6272

Example: Shank form MQ (shank with MQL)



Dimensions in mm.  
MQL-Shank design according to DIN 69090-3.

MQL-Shank design according to DIN69090-3

d2 (h6)	12	16	20	25
l4 (0 / +2)	45	48	50	56
lc (0 / +0,1)	1,7	2,4	3,2	3,7
d1c	2,0	3,0	3,0	4,0

For cutting data recommendation, see pages 6/7.  
Special designs and other coatings available upon request.

# OptiMill®-Alu-Wave

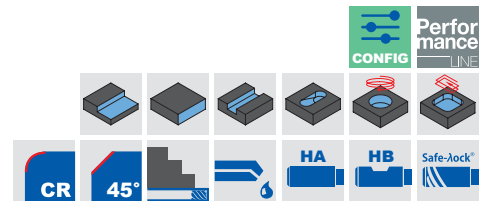
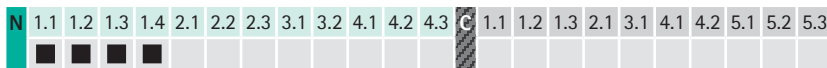
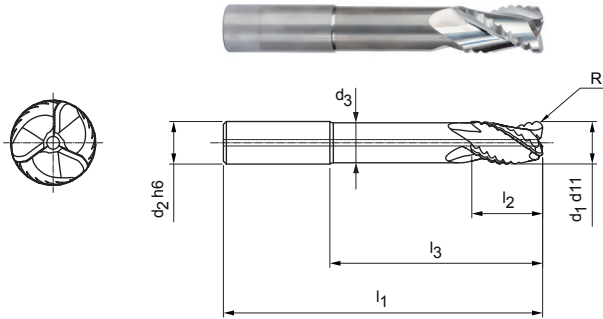
Shoulder milling cutter, extra long projection length with neck, with internal coolant supply SCM109

**Design:**

Diameter of milling cutter: 12.00 - 25.00 mm  
 Cutting material: HU318  
 Number of cutting edges: 3  
 Helix angle: 36°

**Application:**

Before using in the machine, check the cutting data according to machine performance (see cutting data).



Preferred series available from stock | Extra long projection length

Dimensions							z	Specification	Order no.
d1 d11	d2 h6	d3	l1	l2	l3	R			
12,00	12	11,2	106	16	60	2,00	3	SCM109-1200Z03R-R0200HA-HU318	31430823
16,00	16	15,1	129	24	80	3,00	3	SCM109-1600Z03R-R0300HA-HU318	31430826
20,00	20	18,8	150	32	100	3,00	3	SCM109-2000Z03R-R0300HA-HU318	31430831
20,00	20	18,8	150	32	100	4,00	3	SCM109-2000Z03R-R0400HA-HU318	31430832
25,00	25	23,5	163	42	107	3,00	3	SCM109-2500Z03R-R0300HA-HU318	31430837
25,00	25	23,5	163	42	107	4,00	3	SCM109-2500Z03R-R0400HA-HU318	31430838

Configurable features

**Shank form:**  
 Shank form: HB | SL (Safe-lock®) | MQ (shank HA with MQL\*)

**Cutting edge design:**  
 Radius R: 0.40 - 6.50 mm  
 Chamfer Cx45°: 0.40 - 1.00 mm

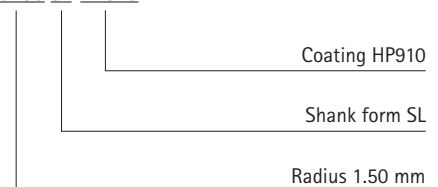
**Coating:**  
 Available as DLC coating with cutting material HP910

**Specification:**  
 SCM109-2500Z03R-[cutting edge design][shank form]-[coating]

Dimensions of configurable radii and corner chamfers

d1	Radius R		Chamfer Cx45°	
	R min.	R max.	Cx45° min.	Cx45° max.
12,00	0,40	3,00	0,40	1,00
16,00	0,50	4,00	0,40	1,00
20,00	0,60	5,20	0,40	1,00
25,00	0,75	6,50	0,40	1,00

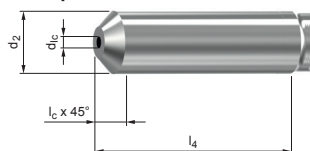
Example:  
 SCM109-2500Z03R-R0150 SL-HP910



Safe-lock® by HAIMER

Manufacturer's ID number: 6272

Example: Shank form MQ (shank with MQL)



Dimensions in mm.  
 MQL-Shank design according to DIN 69090-3.

MQL-Shank design according to DIN69090-3

d2 (h6)	12	16	20	25
l4 (0 / +2)	45	48	50	56
lc (0 / +0,1)	1,7	2,4	3,2	3,7
d1c	2,0	3,0	3,0	4,0

For cutting data recommendation, see pages 6/7.  
 Special designs and other coatings available upon request.

# Cutting data recommendations for shoulder milling cutters

Feed and cutting speed

## OptiMill-Alu-Wave | SCM109 | Machine performance 25 kW to ≤40 kW

MMG*	Workpiece material	Strength/hardness [N/mm <sup>2</sup> ] [HRC]	Cooling		
			MQL/Air	Dry	Wet
N N1	N1.1 Aluminium, unalloyed and alloyed < 3% Si				✓
	N1.2 Aluminium, alloyed ≤ 7% Si				✓
	N1.3 Aluminium, alloyed > 7 - 12% Si				✓
	N1.4 Aluminium, alloyed > 12% Si				✓

## OptiMill-Alu-Wave | SCM109 | Machine performance 40 kW to ≤80 kW

MMG*	Workpiece material	Strength/hardness [N/mm <sup>2</sup> ] [HRC]	Cooling		
			MQL/Air	Dry	Wet
N N1	N1.1 Aluminium, unalloyed and alloyed < 3% Si				✓
	N1.2 Aluminium, alloyed ≤ 7% Si				✓
	N1.3 Aluminium, alloyed > 7 - 12% Si				✓
	N1.4 Aluminium, alloyed > 12% Si				✓

## OptiMill-Alu-Wave | SCM109 | Machine performance >80 kW

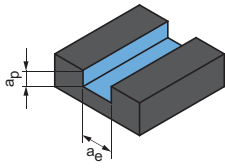
MMG*	Workpiece material	Strength/hardness [N/mm <sup>2</sup> ] [HRC]	Cooling		
			MQL/Air	Dry	Wet
N N1	N1.1 Aluminium, unalloyed and alloyed < 3% Si				✓
	N1.2 Aluminium, alloyed ≤ 7% Si				✓
	N1.3 Aluminium, alloyed > 7 - 12% Si				✓
	N1.4 Aluminium, alloyed > 12% Si				✓

## OptiMill-Alu-Wave | SCM109 | Helix and ramp machining

MZG*	Werkstoff	Strength/hardness [N/mm <sup>2</sup> ] [HRC]	Cooling		
			MQL/Air	Dry	Wet
N N1	N1.1 Aluminium, unalloyed and alloyed < 3% Si				✓
	N1.2 Aluminium, alloyed ≤ 7% Si				✓
	N1.3 Aluminium, alloyed > 7 - 12% Si				✓
	N1.4 Aluminium, alloyed > 12% Si				✓

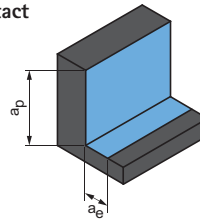
\* MAPAL machining groups

**Full cutting**



**Long projection length**  
 $a_p = 1xD \mid a_e = 1xD$   
**Overlong projection length**  
 $a_p = 1xD \mid a_e = 1xD$   
**Extra long projection length**  
 $a_p = 0.5xD \mid a_e = 1xD$

**Part-contact cutting**



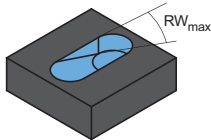
**Long projection length**  
 $a_p = 1.5xD \mid a_e = 0.6xD$   
**Overlong projection length**  
 $a_p = 1.5xD \mid a_e = 0.4xD$   
**Extra long projection length**  
 $a_p = 1.5xD \mid a_e = 0.25xD$

Full cutting					Part-contact cutting				
	Feed per tooth [ $f_z$ ] [mm/tooth] for diameter of milling cutter					Feed per tooth [ $f_z$ ] [mm/tooth] for diameter of milling cutter			
$\emptyset$	12.00	16.00	20.00	25.00	$\emptyset$	12.00	16.00	20.00	25.00
$v_c$	600 - 900	600 - 900	300 - 600	300 - 600	$v_c$	600 - 900	600 - 900	400 - 700	300 - 600
Factor $v_c$					Factor $v_c$				
<b>1</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	<b>1</b>	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22
<b>0.95</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	<b>0.95</b>	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22
<b>0.85</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	<b>0.85</b>	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22
<b>0.75</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.2	0.15 - 0.2	<b>0.75</b>	0.12 - 0.22	0.15 - 0.22	0.15 - 0.22	0.15 - 0.22

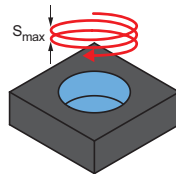
Full cutting					Part-contact cutting				
	Feed per tooth [ $f_z$ ] [mm/tooth] for diameter of milling cutter					Feed per tooth [ $f_z$ ] [mm/tooth] for diameter of milling cutter			
$\emptyset$	12.00	16.00	20.00	25.00	$\emptyset$	12.00	16.00	20.00	25.00
$v_c$	900 - 1200	1100 - 1400	1100 - 1400	900 - 1200	$v_c$	900 - 1200	1100 - 1400	1100 - 1400	900 - 1200
Factor $v_c$					Factor $v_c$				
<b>1</b>	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	<b>1</b>	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25
<b>0.95</b>	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	<b>0.95</b>	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25
<b>0.85</b>	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	<b>0.85</b>	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25
<b>0.75</b>	0.1 - 0.18	0.12 - 0.2	0.14 - 0.21	0.15 - 0.22	<b>0.75</b>	0.1 - 0.22	0.15 - 0.25	0.15 - 0.25	0.15 - 0.25

Full cutting					Part-contact cutting				
	Feed per tooth [ $f_z$ ] [mm/tooth] for diameter of milling cutter					Feed per tooth [ $f_z$ ] [mm/tooth] for diameter of milling cutter			
$\emptyset$	12.00	16.00	20.00	25.00	$\emptyset$	12.00	16.00	20.00	25.00
$v_c$	900 - 1200	1100 - 1400	1300 - 1600	1700 - 2500	$v_c$	900 - 1200	1100 - 1400	1300 - 1600	1700 - 2500
Factor $v_c$					Factor $v_c$				
<b>1</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	<b>1</b>	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27
<b>0.95</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	<b>0.95</b>	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27
<b>0.85</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	<b>0.85</b>	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27
<b>0.75</b>	0.1 - 0.18	0.12 - 0.2	0.15 - 0.23	0.15 - 0.23	<b>0.75</b>	0.1 - 0.22	0.13 - 0.25	0.15 - 0.27	0.15 - 0.27

**Ramps**



**Helix milling**



RW max.	S <sub>max</sub> .	max. helix angle
30°	0,75xD	5° - 10°
30°	0,75xD	5° - 10°
30°	0,75xD	5° - 10°
30°	0,75xD	5° - 10°

The specified machining values are guide values.  
 The optimum data for the respective machining task should be determined during the test or machining.



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