

Milling parameters of SikaBlock® and Biresin®

Description

- Subject The machining of **SikaBlock®** board materials, **Biresin®** model casting resin and pastes
 - Goal Starting parameters for the machining of different types of **SikaBlock®** and **Biresin®**
 - Approach To carry out several types of machining in different materials, to gain machining information. Important types of machining are: slot milling, side milling and 3D milling.
- 2000: Jabro Tools tested the 4 most asked types of **SikaBlock® M** types on a Mikron UMS710 machine, included **SikaBlock® M450, M900**
- 2004: Together with the company Schreurs Tools Jabro Tools used a Mikron UMS710 machine.
In this time occurred several tests with the 6 newest types:
SikaBlock® M550, M610, M912, M960, M1000, M1050,
- 2008: Further tests
- Contained materials **SikaBlock® M80, M80 Neu, M150, M150 Neu, M160, M300, M330, M440, M450, M550, M610, M650, M700, M900, M911, M940, M950, M960, M970, M1000, M1050, M2010, Biresin® M67, M72, M72 Classic, M73, M75, M82,**
 - Parameters In the next application parameters you will find the tables with the most suitable tools and starting parameters for several types of machining.
- In the tables you will find the values according machining (slot milling, side milling and 3D milling) The cuttingspeed (which you can calculate the r.p.m.), feed per tooth (with which you can calculate the feedrate), cutting depth (ap) and the cutting width (ae) are also mentioned.

Calculation basis

- Form symbols

ae:	cutting width / line spacing	ap:	cutting depth
D:	tool diameter	n:	revolutions per minute (rpm)
fz:	feedrate per tooth	vf:	feed rate
vc:	cutting speed	z:	number of teeth

- Conversion forms

n =	$\frac{vc \cdot 1000}{D \cdot \pi}$	[1/min]
vc =	$\frac{n \cdot \pi \cdot D}{1000}$	[m/min]
vf =	$n \cdot fz \cdot z$	[mm/min]
fz =	$\frac{vf}{z \cdot n}$	[mm]



SikaBlock® M80



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,030	0,030	0,030
Ø 4	0,050	0,050	0,050
Ø 6	0,080	0,080	0,070
Ø 8	0,120	0,120	0,100
Ø 10	0,150	0,150	0,130
Ø 12	0,200	0,200	0,150
Ø 16	0,250	0,250	0,190
Ø 20	0,300	0,300	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M150, M150 Neu



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,030	0,030	0,030
Ø 4	0,050	0,050	0,050
Ø 6	0,080	0,080	0,070
Ø 8	0,120	0,120	0,100
Ø 10	0,150	0,150	0,130
Ø 12	0,200	0,200	0,150
Ø 16	0,250	0,250	0,190
Ø 20	0,300	0,300	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from
Jabro Tools, for tool dimensions.



SikaBlock® M160



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,030	0,030	0,030
Ø 4	0,050	0,050	0,050
Ø 6	0,080	0,080	0,070
Ø 8	0,120	0,120	0,100
Ø 10	0,150	0,150	0,130
Ø 12	0,200	0,200	0,150
Ø 16	0,250	0,250	0,190
Ø 20	0,300	0,300	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
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*Consult the Standard- and Tornado catalogue from
Jabro Tools, for tool dimensions.



SikaBlock® M300



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,020	0,031
Ø 4	0,040	0,040	0,052
Ø 6	0,080	0,080	0,090
Ø 8	0,100	0,100	0,110
Ø 10	0,120	0,120	0,130
Ø 12	0,140	0,140	0,150
Ø 16	0,180	0,180	0,190
Ø 20	0,220	0,220	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M330



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,020	0,031
Ø 4	0,040	0,040	0,052
Ø 6	0,080	0,080	0,090
Ø 8	0,100	0,100	0,110
Ø 10	0,120	0,120	0,130
Ø 12	0,140	0,140	0,150
Ø 16	0,180	0,180	0,190
Ø 20	0,220	0,220	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M440



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,020	0,031
Ø 4	0,055	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M450



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,020	0,031
Ø 4	0,055	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M550



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1300	1300	1300
aemax	d	0,5 x d	0,03 x d
apmax	0,9 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,019	0,021	0,030
Ø 4	0,034	0,039	0,051
Ø 6	0,056	0,064	0,069
Ø 8	0,075	0,079	0,099
Ø 10	0,091	0,099	0,129
Ø 12	0,100	0,119	0,149
Ø 16	0,158	0,168	0,189
Ø 20	0,195	0,208	0,249

We have been testing with cuttingspeeds of 100-1600 m/min.
1300 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M610



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
$\underline{V_c}$	1400	1400	1400
aemax	d	0,5 x d	0,03 x d
apmax	0,75 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,019	0,021	0,030
Ø 4	0,034	0,039	0,051
Ø 6	0,056	0,064	0,069
Ø 8	0,075	0,079	0,099
Ø 10	0,091	0,099	0,129
Ø 12	0,100	0,119	0,149
Ø 16	0,158	0,168	0,189
Ø 20	0,195	0,208	0,249

We have been testing with cuttingspeeds of 100-1600 m/min.
1400 m/min appeared to be the best. (if possible on the concerned machine)

To machine glued joints is no problem with the mentioned tools.

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M650



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1300	1300	1300
aemax	d	0,5 x d	0,03 x d
apmax	0,9 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,019	0,021	0,030
Ø 4	0,034	0,039	0,051
Ø 6	0,056	0,064	0,069
Ø 8	0,075	0,079	0,099
Ø 10	0,091	0,099	0,129
Ø 12	0,100	0,119	0,149
Ø 16	0,158	0,168	0,189
Ø 20	0,195	0,208	0,249

We have been testing with cuttingspeeds of 100-1600 m/min.
1300 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M700



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1300	1300	1300
aemax	d	0,5 x d	0,03 x d
apmax	0,9 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,019	0,021	0,030
Ø 4	0,034	0,039	0,051
Ø 6	0,056	0,064	0,069
Ø 8	0,075	0,079	0,099
Ø 10	0,091	0,099	0,129
Ø 12	0,100	0,119	0,149
Ø 16	0,158	0,168	0,189
Ø 20	0,195	0,208	0,249

We have been testing with cuttingspeeds of 100-1600 m/min.
1300 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M900



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
$\underline{V_c}$	800	800	800
aemax	d	0,5 x d	0,03 x d
apmax	0,7 x d	2 x d	0,04 x d
	fz	fz	fz
Ø 2	0,019	0,021	0,030
Ø 4	0,034	0,039	0,051
Ø 6	0,056	0,064	0,069
Ø 8	0,075	0,079	0,099
Ø 10	0,091	0,099	0,129
Ø 12	0,100	0,119	0,149
Ø 16	0,158	0,168	0,189
Ø 20	0,195	0,208	0,249

We have been testing with cuttingspeeds of 100-1600 m/min.
800 m/min. appeared to be the best (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our JH110*, JH440*, and JH450* from our Tornado program (see picture on the right). The JH110 geometry is developed for hardened materials, so the maximum removal per revolution is less than the JH440 and JH450.

* Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M911



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	900	900	900
aemax	d	0,6 x d	0,03 x d
apmax	0,8 x d	2 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,022	0,031
Ø 4	0,035	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
900 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* from our Tornado program (see picture on the right)..

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M940



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,022	0,031
Ø 4	0,035	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M950



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,022	0,031
Ø 4	0,035	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M960



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1100	1100	1100
aemax	d	0,5 x d	0,03 x d
apmax	0,7 x d	1,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,022	0,031
Ø 4	0,035	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1100 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M970



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1100	1100	1100
aemax	d	0,5 x d	0,03 x d
apmax	0,7 x d	1,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,022	0,031
Ø 4	0,035	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1400 m/min appeared to be the best. (if possible on concerning machine)

To machine glued joints is no problem with the mentioned tools.

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* from our Tornado program

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M980



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1500	1500	1500
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,020	0,022	0,031
Ø 4	0,035	0,040	0,052
Ø 6	0,057	0,065	0,070
Ø 8	0,076	0,080	0,100
Ø 10	0,092	0,100	0,130
Ø 12	0,105	0,120	0,150
Ø 16	0,160	0,170	0,190
Ø 20	0,200	0,210	0,250

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M1000



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1300	1300	1300
aemax	d	0,6 x d	0,03 x d
apmax	1 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,018	0,020	0,028
Ø 4	0,032	0,036	0,047
Ø 6	0,051	0,059	0,063
Ø 8	0,068	0,072	0,090
Ø 10	0,083	0,090	0,117
Ø 12	0,095	0,108	0,135
Ø 16	0,144	0,153	0,171
Ø 20	0,180	0,189	0,225

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best (if possible on the concerned machine).

To gain the best surface quality during finishing, we recommend our JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool dimensions.



SikaBlock® M1050



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1000	1000	1000
aemax	d	0,5 x d	0,03 x d
apmax	0,8 x d	2,0 x d	0,04 x d
	fz	fz	fz
Ø 2	0,016	0,018	0,025
Ø 4	0,028	0,032	0,042
Ø 6	0,046	0,052	0,056
Ø 8	0,061	0,064	0,080
Ø 10	0,074	0,080	0,104
Ø 12	0,084	0,096	0,120
Ø 16	0,128	0,136	0,152
Ø 20	0,160	0,168	0,200

We have been testing with cuttingspeeds of 100-1600 m/min.
1500 m/min appeared to be the best (if possible on the concerned machine).

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* from our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



SikaBlock® M2010



J-97 Geometry in several sizes*

J-93 Geometry in several sizes*

	Slot	Side	3D
V_c	1300	1300	1300
aemax	d	0,5 x d	0,03 x d
apmax	0,9 x d	2,5 x d	0,04 x d
	fz	fz	fz
Ø 2	0,019	0,021	0,030
Ø 4	0,034	0,039	0,051
Ø 6	0,056	0,064	0,069
Ø 8	0,075	0,079	0,099
Ø 10	0,091	0,099	0,129
Ø 12	0,100	0,119	0,149
Ø 16	0,158	0,168	0,189
Ø 20	0,195	0,208	0,249

We have been testing with cuttingspeeds of 100-1600 m/min.
1300 m/min appeared to be the best. (if possible on the concerned machine)

To gain the best surface quality during finishing, we recommend our
JH440* and the JH450* of our Tornado program (see picture on the right).

*Consult the Standard- and Tornado catalogue from Jabro Tools, for tool
dimensions.



Biresin® Paste materials

Based on the material properties of pastes, model casting resins and boards we can recommend the following milling parameters:

Type of Paste / Casting Resin	Comparable board material
Biresin® M67	SikaBlock® M700
Biresin® M72 Neu	SikaBlock® M700
Biresin® M72 Classic	SikaBlock® M700
Biresin® M73	SikaBlock® M700
Biresin® M75	SikaBlock® M1050
Biresin® M82	SikaBlock® M700

Conclusion

- **Result** By doing these tests we have obtained a few usable tables to look up starting parameters for the machining of **SikaBlock®** board materials very quickly.
- **Conclusion** You can machine **SikaBlock®** board materials very good if you use the parameters from the tables.
Some problems that can arise are for example the adhesion of materials to the clearance surface of the tool. This means that a binder of the concerning material, due to heat development, will stay glued to the solid carbide tool. This will not result in any difficulties during machining, maybe a small portion of chips could stay onto the part, which are normally easy to remove, but it indicates that the cutting speed may be a bit to high.
Furthermore we tested glued parts, because this also often occurs. No changes worth mentioning did arise during this test.
The most important aspect to look for during the machining of **SikaBlock®** board materials is the feedrate per tooth. Some types have a light cracking feature, which results in breakouts at the end of a cut. A to high feedrate per tooth can cause crumbling of the material when the cutter comes out of the material. So it is better to use a reduced feedrate (15% less as mentioned in the table) on sharp edges.

Further information or questions:

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