

# ALIEN TOOLS

FUTURISTIC MICRO-MILLING TECHNOLOGY

POWERED BY ZECHA

DOCUMENT: MILLING GUIDES

PREPARED FOR: ALIEN INSIDERS

CLASSIFICATION: TOP SECRET

THEY'VE ARRIVED



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FUTURISTIC MICRO-MILLING TECHNOLOGY

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## ZIRCONIA MILLING STRATEGY GUIDES

Every zirconia is slightly different and depending on the pre-sintering levels by the manufacturer it will affect the hardness of the material. The easiest way to see this is in the shrinkage factor...the higher the number the softer the material is. This is why we have two different recommendations for zirconia depending on the hardness.

### GENERAL NOTES:

- Normal Milling Direction: INSIDE to OUTSIDE
- Milling Direction on Crown Cavity: OUTSIDE to INSIDE
- Milling Direction for 0.3 and 0.6 mm Tools on Occlusal Grooves and Margins: OUTSIDE TO INSIDE
- Optional for 1 mm Tools on Margins: 15 mm/sec Feed Rate, 0.05 Depth Step, Direction OUTSIDE TO INSIDE

### FOR HARD ZIRCONIA (SHRINKAGE FACTOR <1.235)

CUTTING DIAMETER	CUTTING GEOMETRY	NR. OF FLUTES	SPINDLE SPEED	FEED RATE	DEPTH STEP	SIDE STEP (OVERLAP %)	OFFSET
2.5 mm	BALL	2	20,000 rpm	25 mm/sec	0.5 mm	1.0 mm (60%)	0.05 mm
YOUR ADJUSTED VALUES ->							
2.0 mm	BALL	2	22,000 rpm	25 mm/sec	0.5 mm	0.9 mm (55%)	0 mm
YOUR ADJUSTED VALUES ->							
1.0 mm	BALL	2	25,000 rpm	20 mm/sec*	0.1-0.2 mm*	0.1 mm (90%)	0 mm
YOUR ADJUSTED VALUES ->							
0.6 mm	BALL	2	27,000 rpm	15 mm/sec**	0.1 mm**	0.08 mm (87%)	0 mm
YOUR ADJUSTED VALUES ->							
0.5 mm	BALL	2	27,000 rpm	15 mm/sec	0.08 mm	0.08 mm (84%)	0 mm
YOUR ADJUSTED VALUES ->							
0.3 mm	BALL	2	29,000 rpm	10 mm/sec	0.05-0.07 mm	0.05 mm (83%)	0 mm
YOUR ADJUSTED VALUES ->							

\*For 1mm tools with the longer 20mm Reach Length (RL), reduce the Feed Rate and Depth Step approximately 20% to avoid tool breakage.

\*\*For 0.6mm tools with the longer 10mm Reach Length (RL), reduce the Feedrate and Depth Step approximately 10-15% to avoid tool breakage.

### NOTES:





## ZIRCONIA MILLING STRATEGY GUIDES

Every zirconia is slightly different and depending on the pre-sintering levels by the manufacturer it will affect the hardness of the material. The easiest way to see this is in the shrinkage factor...the higher the number the softer the material is. This is why we have two different recommendations for zirconia depending on the hardness.

### GENERAL NOTES:

- Normal Milling Direction: INSIDE to OUTSIDE
- Milling Direction on Crown Cavity: OUTSIDE to INSIDE
- Milling Direction for 0.3 and 0.6 mm Tools on Occlusal Grooves and Margins: OUTSIDE TO INSIDE
- Optional for 1 mm Tools on Margins: 15 mm/sec Feed Rate, 0.05 Depth Step, Direction OUTSIDE TO INSIDE

### FOR SOFTER ZIRCONIA (SHRINKAGE FACTOR >1.235)

CUTTING DIAMETER	CUTTING GEOMETRY	NR. OF FLUTES	SPINDLE SPEED	FEED RATE	DEPTH STEP	SIDE STEP (OVERLAP %)	OFFSET
2.5 mm	BALL	2	21,000 rpm	30 mm/sec	0.6 mm	1.1 mm (56%)	0.1 mm
YOUR ADJUSTED VALUES ->							
2.0 mm	BALL	2	23,000 rpm	30 mm/sec	0.6 mm	0.95 mm (53%)	0 mm
YOUR ADJUSTED VALUES ->							
1.0 mm	BALL	2	26,000 rpm	25 mm/sec*	0.1-0.2 mm*	0.1 mm (90%)	0 mm
YOUR ADJUSTED VALUES ->							
0.6 mm	BALL	2	28,000 rpm	20 mm/sec**	0.1 mm**	0.08 mm (87%)	0 mm
YOUR ADJUSTED VALUES ->							
0.5 mm	BALL	2	28,000 rpm	20 mm/sec	0.08 mm	0.08 mm (84%)	0 mm
YOUR ADJUSTED VALUES ->							
0.3 mm	BALL	2	30,000 rpm	15 mm/sec	0.05-0.07 mm	0.05 mm (83%)	0 mm
YOUR ADJUSTED VALUES ->							

\*For 1mm tools with the longer 20mm Reach Length (RL), reduce the Feed Rate and Depth Step approximately 20% to avoid tool breakage.

\*\*For 0.6mm tools with the longer 10mm Reach Length (RL), reduce the Feedrate and Depth Step approximately 10-15% to avoid tool breakage.

### NOTES:



## CoCr MILLING STRATEGY GUIDES

### GENERAL NOTES:

- Normal Milling Direction: INSIDE to OUTSIDE
- Milling Direction on Crown Cavity: OUTSIDE to INSIDE
- Milling Direction for 0.6 mm Tools on Occlusal Grooves and Margins: OUTSIDE TO INSIDE

### WARNINGS:

- Values, especially by Feed Rate and Depth Step, rely heavily on the machine model
- Maximum values only to be used with machines that have very little vibration and strong spindles
- Especially by 'harder' CoCr blanks (tungsten > 3%) the Spindle Speed, Feed Rate, and Depth Step should all be reduced

CUTTING DIAMETER	INDICATION	CUTTING GEOMETRY	NR. OF FLUTES	SPINDLE SPEED	FEED RATE	DEPTH STEP	SIDE STEP (OVERLAP %)	OFFSET
3.0 mm	HI-SPEED ROUGHING	TORIC (BULL)	3	10,200 rpm	30 mm/sec	0.20-0.25 mm	1.2 mm (60%)	0.05 mm
YOUR ADJUSTED VALUES ->								
3.0 mm	ROUGHING	BALL	2	13,700 rpm	20-25 mm/sec	0.12-0.24 mm	1.2 mm (60%)	0.05 mm
YOUR ADJUSTED VALUES ->								
2.0 mm	HI-SPEED ROUGHING	TORIC (BULL)	3	14,500 rpm	28-30 mm/sec	0.12-0.20 mm	0.7 mm (65%)	0.03 mm
YOUR ADJUSTED VALUES ->								
2.0 mm	ROUGHING	BALL	2	15,900 rpm	20-23 mm/sec	0.15-0.20 mm	0.9 mm (55%)	0.03 mm
YOUR ADJUSTED VALUES ->								
2.0 mm	FINISHING	TORIC (BULL)	4	16,000 rpm	26-28 mm/sec	0.1-0.12 mm	0.7 mm (65%)	0.03 mm
YOUR ADJUSTED VALUES ->								
1.5 mm	FINISHING	TORIC (BULL)	4	21,200 rpm	11 mm/sec	0.03 mm	0.3 mm (80%)	0 mm
YOUR ADJUSTED VALUES ->								
1.5 mm	FINISHING	BALL	2	20,500 rpm	15-20 mm/sec	0.08-0.12 mm	0.15 mm (90%)	0 mm
YOUR ADJUSTED VALUES ->								
1.0 mm	FINISHING	BALL	2	23,200 rpm	15-18 mm/sec	0.05-0.07 mm	0.05 mm (83%)	0 mm
YOUR ADJUSTED VALUES ->								
0.6 mm	FINISHING	BALL	2	25,000 rpm	15-16 mm/sec	0.05 mm	0.04 mm (93%)	0 mm
YOUR ADJUSTED VALUES ->								

### NOTES:























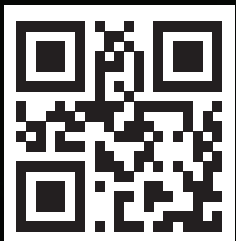
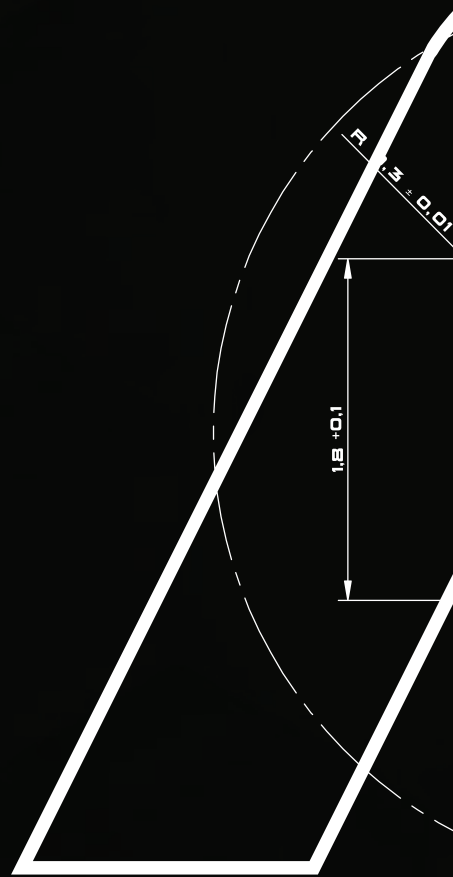
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