



Tip Series / Style

- 47C_RN:**
4-6 Flute Serrated Rough Mill
- 47D_RO:**
4 Flute Rough & Finish Mill
- 49D_RO:**
7-9 Flute Finish Mill

Diameter Range

.312-1.000

Adaption

T05, T06, T08, T10, T12 & T15

Corners

.015-.031 R
.010-.020 x 45 Chamfer

Materials

Steel, Stainless Steel, Iron,
Hi-Temp Alloys, Titanium



New End Mill Tips with 1.5xD Flute Length

Ingersoll is pleased to announce an expansion of the ChipSurfer End Mill line by increasing the flute L/D Ratio from 0.7xD to 1.5xD. High metal removal rates can be expected when doing shoulder roughing, semi-finishing and finishing applications. The 1.5xD tips also accommodate more re-sharpening opportunities than their .7xD brothers.

Features & Benefits:

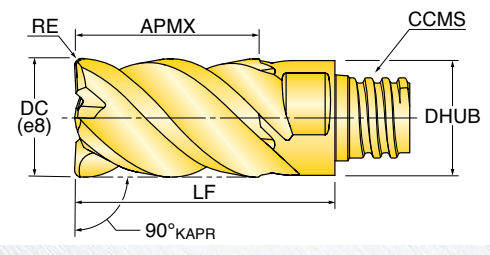
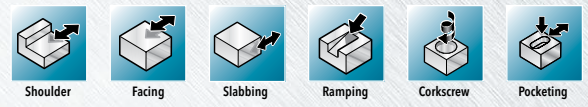
- 4-6 Flute Roughing Mills equipped with serrations to promote accelerated feed rates and better chip evacuation with airblast
- 4 Flute Rough & Finish Mills equipped with variable pitch to reduce harmonic chatter
- 7-9 Flute Finish Mills equipped different helix and variable pitch to diffuse vibration
- Best suited with Weldon Shank for utmost rigidity and holding
- Tips repeat within +/- .0005" and can be indexed on the machine in seconds
- Feature variations can be quoted





CHIPSURFER™ SERIES 47D: 90° VARIABLE PITCH END MILL

4-FLUTE, 46° HELIX, CENTER-CUTTING, 1.5XD FLUTE



Part Number	DC Cutting Diameter	RE/CHW Corner Radius/Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.
47D-3146TQR001	0.312	0.015 R	0.469	0.709	4	46.5	Chip Surfer T05	0.300	90
47D-3756T6RQ001	0.375	0.015 R	0.563	0.866	4	46.5	Chip Surfer T06	0.366	90
47D-5075T8RQ001	0.500	0.015 R	0.750	1.063	4	46.5	Chip Surfer T08	0.488	90
47D-6293TRRQ001	0.625	0.015 R	0.938	1.319	4	46.5	Chip Surfer T10	0.602	90
47D-7511TSRQ003	0.750	0.031 R	1.125	1.614	4	46.5	Chip Surfer T12	0.726	90
47D-1015TURQ003	1.000	0.031 R	1.500	2.067	4	46.5	Chip Surfer T15	0.941	90

*When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold separately.

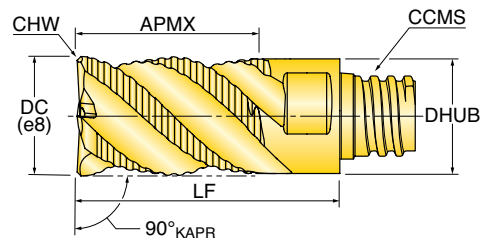
CHIPSURFER™ HARDWARE

	OPTIONAL	**OPTIONAL**	Tightening Torque (in. lbs.)
47D-3146TQR001	WS-0043	DT-60-06	60
47D-3756T6RQ001	WS-0029	DT-90-08	90
47D-5075T8RQ001	WS-0030	DT-130-10	130
47D-6293TRRQ001	WS-0044	DT-250-13	250
47D-7511TSRQ003	WS-0059	DT-250-16	250
47D-1015TURQ003	WS-0061	DT-350-20	350



CHIP SURFER™ SERIES 47C, 48C: 90° ROUGHING END MILL

4-6 FLUTE, 40°-47° HELIX, 1.5XD FLUTE
4-FLUTE CENTER-CUTTING, 5-6 FLUTE NON-CENTER-CUTTING



Part Number	DC Cutting Diameter	RE/CHW Corner Radius/Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.
47C-3146TQRN01	0.312	0.010 Chamfer	0.469	0.709	4	46	Chip Surfer T05	0.300	90
47C-3756T6RN01	0.375	0.012 Chamfer	0.563	0.866	4	46	Chip Surfer T06	0.366	90
47C-5075T8RN01	0.500	0.014 Chamfer	0.750	1.063	4	46	Chip Surfer T08	0.488	90
47C-6293TRRN01	0.625	0.016 Chamfer	0.938	1.319	5	40	Chip Surfer T10	0.602	7
48C-7511TSRN01	0.750	0.016 Chamfer	1.125	1.614	6	47	Chip Surfer T12	0.726	3
48C-1015TURN02	1.000	0.020 Chamfer	1.500	2.067	6	47	Chip Surfer T15	0.941	3

*When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold separately.

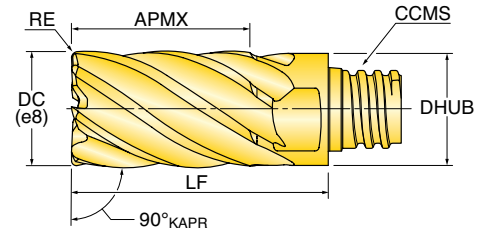
CHIP SURFER™ HARDWARE

	OPTIONAL	**OPTIONAL**	Tightening Torque (in. lbs.)
47C-3146TQRN01	WS-0043	DT-60-06	60
47C-3756T6RN01	WS-0029	DT-90-08	90
47C-5075T8RN01	WS-0030	DT-130-10	130
47C-6293TRRN01	WS-0044	DT-250-13	250
48C-7511TSRN01	WS-0059	DT-250-16	250
48C-1015TURN02	WS-0061	DT-350-20	350



CHIPSURFER™ SERIES 49D: 90° FINISHING END MILL

7-9 FLUTE, 36° HELIX, NON-CENTER-CUTTING, 1.5XD FLUTE



Part Number	DC Cutting Diameter	RE/CHW Corner Radius/Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.
49D-3146TQRQ01	0.312	0.015 R	0.469	0.709	7	36	Chip Surfer T05	0.300	3
49D-3756T6RQ01	0.375	0.015 R	0.563	0.866	7	36	Chip Surfer T06	0.366	3
49D-5075T8RQ01	0.500	0.015 R	0.750	1.063	7	36	Chip Surfer T08	0.488	3
49D-6293TRRQ03	0.625	0.031 R	0.938	1.319	9	36	Chip Surfer T10	0.602	1
49D-7511TSRQ03	0.750	0.031 R	1.125	1.614	9	36	Chip Surfer T12	0.726	1
49D-1015TURQ03	1.000	0.031 R	1.500	2.067	9	36	Chip Surfer T15	0.941	1

*When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold separately.

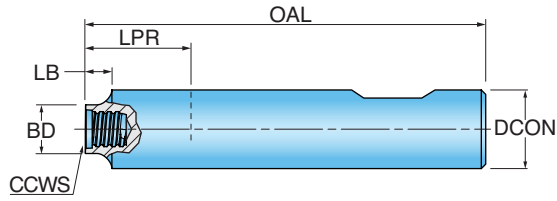
CHIPSURFER™ HARDWARE

	OPTIONAL	**OPTIONAL**	Tightening Torque (in. lbs.)
49D-3146TQRQ01	WS-0043	DT-60-06	60
49D-3756T6RQ01	WS-0029	DT-90-08	90
49D-5075T8RQ01	WS-0030	DT-130-10	130
49D-6293TRRQ03	WS-0044	DT-250-13	250
49D-7511TSRQ03	WS-0059	DT-250-16	250
49D-1015TURQ03	WS-0061	DT-350-20	350



CHIP SURFER™ SERIES W*T*SA: STRAIGHT SHANK WITH "T" CONNECTION

STEEL, WELDON-STYLE, STUBBY NECK RELIEF



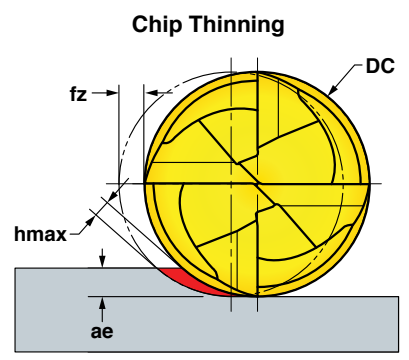
Part Number	CCWS Conn. Code Workpiece Side	LB Body Length 1	LPR Protruding Length	OAL Overall Length	BD Body Diameter	DCON Shank Diameter	BMC Body Mat'l Code
WB050T05SA-00	Chip Surfer T05	0.170	0.40	2.185	0.300	0.500	Steel
WB062T06SA-00	Chip Surfer T06	0.230	0.65	2.560	0.360	0.625	Steel
WB062T08SA-00	Chip Surfer T08	0.130	0.65	2.560	0.480	0.625	Steel
WB075T10SA-00	Chip Surfer T10	0.130	0.76	2.750	0.600	0.750	Steel
WB100T12SA-00	Chip Surfer T12	0.300	0.75	3.000	0.720	1.000	Steel
WB125T15SA-00	Chip Surfer T15	0.300	1.75	4.000	0.940	1.250	Steel

*When assembling, be sure tip is seated firmly on shank with no gap. Tightening Torque: T05=60in/lbs, T06=90in/lbs, T08=130in/lbs, T10=250in/lbs, T12=250in/lbs, T15=350in/lbs. No lubricant on adaption. Wrenches sold separately.



CHIPSURFER™ OPERATING GUIDELINES

47C / 47D / 49D (1.5XD)



* When ae is less than 25% DC, recommend use of Chip Thinning Calculator to ensure hmax is within fz range.

ISO	Materials			Cutting Speed SFM	DC Cutting Dia. (inch)	fz* Feed per Tooth (inch)	Coolant
	Mat'l Group #VDI 3323	Type	Examples				
P	1 thru 5	Non-alloy Steel	1018, A36, 1045, A572, 1070	450-650	0.312	.0010-.0030	No
					0.375	.0010-.0035	
					0.500	.0015-.0040	
					0.625	.0015-.0040	
					0.750	.0020-.0045	
	6 thru 9	Low-alloy Steel	4140, 4340, P20, 8620, 300M	450-650	0.312	.0010-.0030	
					0.375	.0010-.0035	
					0.500	.0015-.0040	
					0.625	.0015-.0040	
					0.750	.0020-.0045	
	10, 11	High-alloy Steel	H13, A2, D2, M2, T1	400-600	0.312	.0010-.0025	
					0.375	.0010-.0030	
					0.500	.0015-.0035	
					0.625	.0015-.0035	
					0.750	.0020-.0040	
M	12 thru 14	Stainless Steel	410, 416, 440, 303, 304, 316, 15-5, 17-4	200-450	0.312	.0010-.0025	May be required at high speeds
					0.375	.0010-.0030	
					0.500	.0015-.0035	
					0.625	.0015-.0035	
					0.750	.0020-.0040	
K	15 thru 20	Iron	CLS. 20, 30, 45, 60-40-18, 100-70-03	500-800	0.312	.0010-.0030	No
					0.375	.0010-.0035	
					0.500	.0015-.0040	
					0.625	.0015-.0040	
					0.750	.0020-.0045	
S	31 thru 37	High-Temp, Ti	Inconel, Hastelloy, 6Al-4V, 5Al-5Mo-5V-3Cr	65-250	0.312	.0010-.0025	Yes
					0.375	.0010-.0030	
					0.500	.0015-.0035	
					0.625	.0015-.0035	
					0.750	.0020-.0040	

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.

CHIP SURFER™ INDEXING CHIP SURFER TIPS

- Step 1: Screw tip into shank until finger tight (Figure 1a). Note a .010" gap (Figure 1b).
- Step 2: Use wrench to torque approximately 1/4 turn, creating a simultaneous fit (Figure 2).
- Step 3: Use .001" shim stock to check the simultaneous fit at the intersection of the tip and the shank.
The shim should not be able to enter the intersection (Figure 3a).
If it does, tighten further with the wrench until there is no gap (Figure 3b).

Note: Pre-set torque wrenches (series DT- . . .) can be purchased.

