

# List 9592 - EXOPRO® PHX : Pencil-Neck, Deep Feed, Corner Radius

## Side Milling

Hardness			<41 HRC					42-55 HRC					49-55 HRC		
Work Material			Hardened and Pre-hardened Steels												
Cutting Speed			110-395 SFM					110-250 SFM					110-410 SFM		
D (mm)	r (mm)	L2 (mm)	Speed (RPM)	Feed (in/min)		DOC (in)		Speed (RPM)	Feed (in/min)		DOC (in)		Speed (RPM)	Feed (in/min)	DOC (in)
				Slotting	Contouring	Aa	Ar		Slotting	Contouring	Aa	Ar			
0.8		2	18,000	28.3	36.6	0.0008	0.0079	18,000	28.3	36.6	0.0008	0.0079	18,000	45.3	0.0006
		4	18,000	28.3	36.6	0.0008	0.0079	18,000	28.3	36.6	0.0008	0.0079	18,000	45.3	0.0006
		6	18,000	28.3	36.6	0.0008	0.0079	18,000	28.3	36.6	0.0008	0.0079	18,000	45.3	0.0006
		8	15,000	21.3	26.8	0.0006	0.0079	15,000	21.3	24.8	0.0005	0.0079	16,000	27.6	0.0005
1.0	0.1	4	18,000	32.7	43.3	0.0012	0.0091	18,000	32.7	34.6	0.0012	0.0091	18,000	56.7	0.0006
		6	18,000	32.7	43.3	0.0009	0.0091	18,000	32.7	34.6	0.0009	0.0091	18,000	56.7	0.0006
		8	15,000	29.5	39.4	0.0005	0.0091	15,000	29.5	31.5	0.0005	0.0091	15,000	47.2	0.0006
		10	12,000	11.8	19.7	0.0003	0.0079	12,000	11.8	15.7	0.0003	0.0079	12,000	37.8	0.0006
		12	10,500	8.7	14.2	0.0002	0.0071	10,500	8.7	11.3	0.0002	0.0071	10,500	33.1	0.0006
		4	18,000	32.7	43.3	0.0012	0.0091	18,000	32.7	34.6	0.0012	0.0091	18,000	56.7	0.0007
	0.2	6	18,000	32.7	43.3	0.0009	0.0091	18,000	32.7	34.6	0.0009	0.0091	18,000	56.7	0.0007
		8	15,000	29.5	39.4	0.0005	0.0091	15,000	29.5	31.5	0.0005	0.0091	15,000	47.2	0.0007
		10	12,000	11.8	19.7	0.0003	0.0079	12,000	11.8	15.7	0.0003	0.0079	12,000	37.8	0.0007
		12	10,500	8.7	14.2	0.0002	0.0071	10,500	8.7	11.4	0.0002	0.0071	10,500	33.1	0.0007
		4	18,000	32.7	49.6	0.0012	0.0091	18,000	32.7	39.4	0.0012	0.0091	18,000	56.7	0.0009
		6	18,000	32.7	44.1	0.0009	0.0091	18,000	32.7	35.0	0.0009	0.0091	18,000	56.7	0.0009
1.5	0.1	4	18,000	48.4	65.0	0.0012	0.0134	16,000	42.5	51.2	0.0012	0.0134	18,000	63.8	0.0006
		8	18,000	48.4	65.0	0.0010	0.0134	16,000	42.5	51.2	0.0010	0.0134	18,000	63.8	0.0006
		12	10,000	18.9	31.5	0.0005	0.0118	10,000	17.7	29.5	0.0005	0.0118	10,000	35.4	0.0006
	0.2	4	18,000	48.4	65.0	0.0012	0.0134	16,000	42.5	51.2	0.0012	0.0134	18,000	63.8	0.0007
		6	18,000	48.4	65.0	0.0011	0.0134	16,000	42.5	51.2	0.0011	0.0134	18,000	63.8	0.0007
		8	18,000	48.4	65.0	0.0010	0.0134	16,000	42.5	51.2	0.0010	0.0134	18,000	63.8	0.0007
2.0	0.1	8	18,000	69.3	87.0	0.0012	0.0181	12,000	39.4	51.2	0.0012	0.0181	18,000	63.8	0.0006
		10	15,000	63.8	85.0	0.0012	0.0181	12,000	39.4	47.2	0.0012	0.0181	15,000	53.1	0.0006
		12	13,000	52.0	69.3	0.0009	0.0181	12,000	37.4	45.3	0.0009	0.0181	13,000	46.1	0.0006
		16	7,600	29.5	39.4	0.0005	0.0181	7,600	23.6	30.7	0.0005	0.0181	7,000	24.8	0.0006
	0.3	8	18,000	63.8	87.0	0.0020	0.0181	12,000	39.4	51.2	0.0020	0.0181	18,000	63.8	0.0009
		12	13,000	52.0	69.3	0.0016	0.0181	12,000	37.4	45.3	0.0016	0.0181	13,000	46.1	0.0009
	0.5	6	18,000	69.3	87.0	0.0031	0.0177	12,000	33.5	51.2	0.0031	0.0177	18,000	63.8	0.0010
		8	18,000	69.3	87.0	0.0030	0.0177	12,000	33.5	51.2	0.0030	0.0177	18,000	63.8	0.0010
		10	15,000	63.8	85.0	0.0028	0.0177	12,000	31.5	47.2	0.0028	0.0177	15,000	53.1	0.0010
		12	13,000	52.0	69.3	0.0024	0.0177	12,000	27.6	45.3	0.0024	0.0177	13,000	46.1	0.0010
3.0	0.3	12	12,700	55.1	91.3	0.0018	0.0276	8,000	33.1	47.2	0.0018	0.0276	13,000	46.1	0.0009

1. Adjust the speed, feed, and plunge depth in accordance with operating conditions, including the machining shape, machine rigidity, holder rigidity, and work holding force.
2. If the speed and feed rates cannot increase due to equipment performance, operate by reducing the speed and feed rates at the same ratio.
3. High cutting speeds and feed rates can cause cutter wear or reduce machining precision. Therefore, operate by reducing the feed rate as needed.
4. Depending on the shape to be machined, if the end mill chatters during machining, it can bite into the shape. Therefore, operate by reducing the speed and feed rates at the same ratio.
5. For precise, detailed machining, use a dedicated machine that operates quietly.
6. Operate by keeping the runout at the tip of the end mill below 5 microns (.0002").
7. To perform finish machining with a high level of efficiency, keep the speed and feed rates below 2 times.
8. To finish a flat surface, operate at a speed range with a minimal amount of equipment vibration, making sure than the feed rate does not cause the equipment to wobble.
9. To finish machine a curved surface using the corner radius tool, operate by changing the machining pitch.
10. Set the inclined cut angle approximately between 0.3° and 0.5°.

