



CUTTING CONDITIONS

Threading | Thread mills | Cutting conditions

WHO-EM-PNC

			Low Carbon Steel - Mild Steel ~C0,25%			Medium Carbon Steel - High Carbon Steel ~C0,25%			Alloy Steel SCM		
Recommended Coolant			Water-Soluble			Water-Soluble			Water-Soluble		
Vc (m/min)			35 ~ 55			80 ~ 160			60 ~ 120		
Thread	Thread Size	DC	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)
M	M 3 ×0,5	2,4	5.968	48	0,01	10.610	85	0,01	7.958	64	0,01
	M 4 ×0,7	3,1	4.621	62	0,015	8.214	111	0,015	6.161	83	0,015
	M 5 ×0,8	4	3.581	49	0,017	6.366	87	0,017	4.775	65	0,017
	M 6 ×1	4,6	3.114	58	0,02	5.536	103	0,02	4.152	78	0,02
	M 8 ×1,25	6,2	2.310	62	0,03	4.107	111	0,03	3.080	83	0,03
	M 10 ×1,5	7,5	1.910	67	0,035	3.395	119	0,035	2.546	89	0,035
	M 12 ×1,75	9	1.592	72	0,045	2.829	127	0,045	2.122	95	0,045
	M 16 ×2	11,7	1.224	72	0,055	2.176	129	0,055	1.632	96	0,055
	M 18 ×2,5	14	1.023	55	0,06	1.819	97	0,06	1.364	73	0,06
U	M 20 ×2,5	15,7	912	51	0,065	1.622	91	0,065	1.216	68	0,065
	No. 8 - 32UNC	3,1	4.621	47	0,01	8.214	84	0,01	6.161	63	0,01
	No. 10 - 24UNC	3,7	3.871	54	0,015	6.882	96	0,015	5.162	72	0,015
	1/4 - 20UNC	4,55	3.148	89	0,025	5.597	159	0,025	4.197	119	0,025
	1/4 - 28UNF	4,55	3.148	89	0,025	5.597	159	0,025	4.197	119	0,025
	5/16 - 18UNC	5,7	2.513	85	0,03	4.468	151	0,03	3.351	113	0,03
	3/8 - 16UNC	6,7	2.138	89	0,035	3.801	158	0,035	2.851	118	0,035
	7/16 - 14UNC	7,7	1.860	91	0,04	3.307	162	0,04	2.480	122	0,04
	1/2 - 13UNC	9,2	1.557	77	0,045	2.768	137	0,045	2.076	103	0,045
Rc (PT)	1/16 - 28	4,86	2.982	*1	0,025	5.302	*1	0,025	3.976	*1	0,025
	1/8 - 28	5,76	2.512	*1	0,03	4.465	*1	0,03	3.349	*1	0,03
	1/4 - 19	7,98	1.814	*1	0,04	3.225	*1	0,04	2.419	*1	0,04
	3/8 - 19	9,68	1.493	*1	0,045	2.654	*1	0,045	1.990	*1	0,045
	1/2 - 14	11,61	1.246	*1	0,055	2.215	*1	0,055	1.661	*1	0,055
	1 - 11	15,54	930	*1	0,065	1.654	*1	0,065	1.240	*1	0,065
NPT	1/16 - 27	4,86	2.984	*1	0,025	5.304	*1	0,025	3.978	*1	0,025
	1/8 - 27	5,76	2.513	*1	0,03	4.467	*1	0,03	3.350	*1	0,03
	1/4 - 18	7,98	1.815	*1	0,04	3.227	*1	0,04	2.420	*1	0,04
	3/8 - 18	9,68	1.493	*1	0,045	2.655	*1	0,045	1.991	*1	0,045
	1/2 - 14	11,61	1.246	*1	0,055	2.215	*1	0,055	1.661	*1	0,055
	1 - 11 1/2	15,54	930	*1	0,065	1.653	*1	0,065	1.240	*1	0,065

			Hardened Steel								
			25~45 HRC			45~50 HRC			50~65 HRC		
Recommended Coolant			Air-Blow								
Vc (m/min)			35 ~ 75			35 ~ 65			35 ~ 55		
Thread	Thread Size	DC	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)
M	M 3 ×0,5	2,4	5.968	48	0,01	5.968	48	0,01	5.968	48	0,01
	M 4 ×0,7	3,1	4.621	62	0,015	4.621	62	0,015	4.621	62	0,015
	M 5 ×0,8	4	3.581	49	0,017	3.581	49	0,017	3.581	49	0,017
	M 6 ×1	4,6	3.114	58	0,02	3.114	58	0,02	3.114	58	0,02
	M 8 ×1,25	6,2	2.310	62	0,03	2.310	62	0,03	2.310	62	0,03
	M 10 ×1,5	7,5	1.910	67	0,035	1.910	67	0,035	1.910	67	0,035
	M 12 ×1,75	9	1.592	72	0,045	1.592	72	0,045	1.592	72	0,045
	M 16 ×2	11,7	1.224	72	0,055	1.224	72	0,055	1.224	72	0,055
	M 18 ×2,5	14	1.023	55	0,06	1.023	55	0,06	1.023	55	0,06
M 20 ×2,5	15,7	912	51	0,065	912	51	0,065	912	51	0,065	
U	No. 8 - 32UNC	3,1	4.621	47	0,01	4.621	47	0,01	4.621	47	0,01
	No. 10 - 24UNC	3,7	3.871	54	0,015	3.871	54	0,015	3.871	54	0,015
	1/4 - 20UNC	4,55	3.148	89	0,025	3.148	89	0,025	3.148	89	0,025
	1/4 - 28UNF	4,55	3.148	89	0,025	3.148	89	0,025	3.148	89	0,025
	5/16 - 18UNC	5,7	2.513	85	0,03	2.513	85	0,03	2.513	85	0,03
	3/8 - 16UNC	6,7	2.138	89	0,035	2.138	89	0,035	2.138	89	0,035
	7/16 - 14UNC	7,7	1.860	91	0,04	1.860	91	0,04	1.860	91	0,04
	1/2 - 13UNC	9,2	1.557	77	0,045	1.557	77	0,045	1.557	77	0,045
Rc (PT)	1/16 - 28	4,86	2.982	*1	0,025	2.982	*1	0,025	2.982	*1	0,025
	1/8 - 28	5,76	2.512	*1	0,03	2.512	*1	0,03	2.512	*1	0,03
	1/4 - 19	7,98	1.814	*1	0,04	1.814	*1	0,04	1.814	*1	0,04
	3/8 - 19	9,68	1.493	*1	0,045	1.493	*1	0,045	1.493	*1	0,045
	1/2 - 14	11,61	1.246	*1	0,055	1.246	*1	0,055	1.246	*1	0,055
	1 - 11	15,54	930	*1	0,065	930	*1	0,065	930	*1	0,065
NPT	1/16 - 27	4,86	2.984	*1	0,025	2.984	*1	0,025	2.984	*1	0,025
	1/8 - 27	5,76	2.513	*1	0,03	2.513	*1	0,03	2.513	*1	0,03
	1/4 - 18	7,98	1.815	*1	0,04	1.815	*1	0,04	1.815	*1	0,04
	3/8 - 18	9,68	1.493	*1	0,045	1.493	*1	0,045	1.493	*1	0,045
	1/2 - 14	11,61	1.246	*1	0,055	1.246	*1	0,055	1.246	*1	0,055
	1 - 11 1/2	15,54	930	*1	0,065	930	*1	0,065	930	*1	0,065


* Values vary depending on the depth of hole to be machined.


1. This cutting condition table shows standard values. When machining, it is recommended to use the program created by the NC code generator software ThreadPro.
2. Please adjust the cutting conditions depending on the rigidity of machine, tool holders and workpiece clamping.
3. Tool vibrations should be kept at a minimum level for maximum accuracy.
4. When machining magnesium alloy materials, please use the coolant oil recommended by the coolant oil manufacturer. Please also properly dispose the cutting chips to prevent fire hazards.
5. Spindle rotation must be counterclockwise due to the left-hand cut configuration.

CUTTING CONDITIONS

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WHO-EM-PNC

			Stainless Steel - Tool Steel			Cast Steel - Cast Iron - Ductile Cast Iron			Copper - Brass - Brass Casting - Bronze					
			SUS304 - SKD			SC - FC - FCD			Cu - Bs - BsC - PB			20HRC~		
Recommended Coolant			Water-Soluble			Air-Blow			Water-Soluble					
Vc (m/min)			35 ~ 100			35 ~ 100			35 ~ 100			35 ~ 75		
Thread	Thread Size	DC	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)
M	M 3 ×0,5	2,4	5.968	48	0,01	7.958	64	0,01	7.958	64	0,01	5.968	48	0,01
	M 4 ×0,7	3,1	4.621	62	0,015	6.161	83	0,015	6.161	83	0,015	4.621	62	0,015
	M 5 ×0,8	4	3.581	49	0,017	4.775	65	0,017	4.775	65	0,017	3.581	49	0,017
	M 6 ×1	4,6	3.114	58	0,02	4.152	78	0,02	4.152	78	0,02	3.114	58	0,02
	M 8 ×1,25	6,2	2.310	62	0,03	3.080	83	0,03	3.080	83	0,03	2.310	62	0,03
	M 10 ×1,5	7,5	1.910	67	0,035	2.546	89	0,035	2.546	89	0,035	1.910	67	0,035
	M 12 ×1,75	9	1.592	72	0,045	2.122	95	0,045	2.122	95	0,045	1.592	72	0,045
	M 16 ×2	11,7	1.224	72	0,055	1.632	96	0,055	1.632	96	0,055	1.224	72	0,055
	M 18 ×2,5	14	1.023	55	0,06	1.364	73	0,06	1.364	73	0,06	1.023	55	0,06
M 20 ×2,5	15,7	912	51	0,065	1.216	68	0,065	1.216	68	0,065	912	51	0,065	
U	No. 8 - 32UNC	3,1	4.621	47	0,01	6.161	63	0,01	6.161	63	0,01	4.621	47	0,01
	No. 10 - 24UNC	3,7	3.871	54	0,015	5.162	72	0,015	5.162	72	0,015	3.871	54	0,015
	1/4 - 20UNC	4,55	3.148	89	0,025	4.197	119	0,025	4.197	119	0,025	3.148	89	0,025
	1/4 - 28UNF	4,55	3.148	89	0,025	4.197	119	0,025	4.197	119	0,025	3.148	89	0,025
	5/16 - 18UNC	5,7	2.513	85	0,03	3.351	113	0,03	3.351	113	0,03	2.513	85	0,03
	3/8 - 16UNC	6,7	2.138	89	0,035	2.851	118	0,035	2.851	118	0,035	2.138	89	0,035
	7/16 - 14UNC	7,7	1.860	91	0,04	2.480	122	0,04	2.480	122	0,04	1.860	91	0,04
	1/2 - 13UNC	9,2	1.557	77	0,045	2.076	103	0,045	2.076	103	0,045	1.557	77	0,045
Rc (PT)	1/16 - 28	4,86	2.982	*1	0,025	3.976	*1	0,025	3.976	*1	0,025	2.982	*1	0,025
	1/8 - 28	5,76	2.512	*1	0,03	3.349	*1	0,03	3.349	*1	0,03	2.512	*1	0,03
	1/4 - 19	7,98	1.814	*1	0,04	2.419	*1	0,04	2.419	*1	0,04	1.814	*1	0,04
	3/8 - 19	9,68	1.493	*1	0,045	1.990	*1	0,045	1.990	*1	0,045	1.493	*1	0,045
	1/2 - 14	11,61	1.246	*1	0,055	1.661	*1	0,055	1.661	*1	0,055	1.246	*1	0,055
NPT	1 - 11	15,54	930	*1	0,065	1.240	*1	0,065	1.240	*1	0,065	930	*1	0,065
	1/16 - 27	4,86	2.984	*1	0,025	3.978	*1	0,025	3.978	*1	0,025	2.984	*1	0,025
	1/8 - 27	5,76	2.513	*1	0,03	3.350	*1	0,03	3.350	*1	0,03	2.513	*1	0,03
	1/4 - 18	7,98	1.815	*1	0,04	2.420	*1	0,04	2.420	*1	0,04	1.815	*1	0,04
	3/8 - 18	9,68	1.493	*1	0,045	1.991	*1	0,045	1.991	*1	0,045	1.493	*1	0,045
	1/2 - 14	11,61	1.246	*1	0,055	1.661	*1	0,055	1.661	*1	0,055	1.246	*1	0,055
	1 - 11 1/2	15,54	930	*1	0,065	1.240	*1	0,065	1.240	*1	0,065	930	*1	0,065

			Aluminium Rolled Steel - Aluminium Alloy Casting AL - AC _ ADC			Magnesium Alloy Casting - Zinc Alloy Casting MC - ZDC			Titanium Alloy Ti-6Al-4V		
Recommended Coolant			Water-Soluble			Water-Soluble			Water-Soluble		
Vc (m/min)			35 ~ 100			35 ~ 100			35 ~ 55		
Thread	Thread Size	DC	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)
M	M 3 ×0,5	2,4	10.610	85	0,01	7.958	64	0,01	5.968	48	0,01
	M 4 ×0,7	3,1	8.214	111	0,015	6.161	83	0,015	4.621	62	0,015
	M 5 ×0,8	4	6.366	87	0,017	4.775	65	0,017	3.581	49	0,017
	M 6 ×1	4,6	5.536	103	0,02	4.152	78	0,02	3.114	58	0,02
	M 8 ×1,25	6,2	4.107	111	0,03	3.080	83	0,03	2.310	62	0,03
	M 10 ×1,5	7,5	3.395	119	0,035	2.546	89	0,035	1.910	67	0,035
	M 12 ×1,75	9	2.829	127	0,045	2.122	95	0,045	1.592	72	0,045
	M 16 ×2	11,7	2.176	129	0,055	1.632	96	0,055	1.224	72	0,055
	M 18 ×2,5	14	1.819	97	0,06	1.364	73	0,06	1.023	55	0,06
	M 20 ×2,5	15,7	1.622	91	0,065	1.216	68	0,065	912	51	0,065
U	No. 8 - 32UNC	3,1	8.214	84	0,01	6.161	63	0,01	4.621	47	0,01
	No. 10 - 24UNC	3,7	6.882	96	0,015	5.162	72	0,015	3.871	54	0,015
	1/4 - 20UNC	4,55	5.597	159	0,025	4.197	119	0,025	3.148	89	0,025
	1/4 - 28UNF	4,55	5.597	159	0,025	4.197	119	0,025	3.148	89	0,025
	5/16 - 18UNC	5,7	4.468	151	0,03	3.351	113	0,03	2.513	85	0,03
	3/8 - 16UNC	6,7	3.801	158	0,035	2.851	118	0,035	2.138	89	0,035
	7/16 - 14UNC	7,7	3.307	162	0,04	2.480	122	0,04	1.860	91	0,04
	1/2 - 13UNC	9,2	2.768	137	0,045	2.076	103	0,045	1.557	77	0,045
	1/16 - 28	4,86	5.302	*1	0,025	3.976	*1	0,025	2.982	*1	0,025
Rc (PT)	1/8 - 28	5,76	4.465	*1	0,03	3.349	*1	0,03	2.512	*1	0,03
	1/4 - 19	7,98	3.225	*1	0,04	2.419	*1	0,04	1.814	*1	0,04
	3/8 - 19	9,68	2.654	*1	0,045	1.990	*1	0,045	1.493	*1	0,045
	1/2 - 14	11,61	2.215	*1	0,055	1.661	*1	0,055	1.246	*1	0,055
	1 - 11	15,54	1.654	*1	0,065	1.240	*1	0,065	930	*1	0,065
NPT	1/16 - 27	4,86	5.304	*1	0,025	3.978	*1	0,025	2.984	*1	0,025
	1/8 - 27	5,76	4.467	*1	0,03	3.350	*1	0,03	2.513	*1	0,03
	1/4 - 18	7,98	3.227	*1	0,04	2.420	*1	0,04	1.815	*1	0,04
	3/8 - 18	9,68	2.655	*1	0,045	1.991	*1	0,045	1.493	*1	0,045
	1/2 - 14	11,61	2.215	*1	0,055	1.661	*1	0,055	1.246	*1	0,055
	1 - 11 1/2	15,54	1,653	*1	0,065	1.240	*1	0,065	930	*1	0,065

*1. Values vary depending on the depth of hole to be machined.

1. This cutting condition table shows standard values. When machining, it is recommended to use the program created by the NC code generator software ThreadPro.

2. Please adjust the cutting conditions depending on the rigidity of machine, tool holders, and workpiece clamping.

3. Tool vibrations should be kept at a minimum level for maximum accuracy.

4. When machining magnesium alloy materials, please use the coolant oil recommended by the coolant oil manufacturer. Please also properly dispose the cutting chips to prevent fire hazards.

5. Spindle rotation must be counterclockwise due to the left-hand cut configuration.

* For titanium alloys and Ni-based alloys, the above condition table applies only when using a water-soluble cutting fluid and processing with a thread length approximately 1xD or an oil hole compatible size (oil hole column: ○ mark).

CUTTING CONDITIONS

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WHO-EM-PNC

			Ni-based Alloy - Inconel			Plastic		
Recommended Coolant			Water-Soluble			Water-Soluble		
Vc (m/min)			35 ~ 55			35 ~ 100		
Thread	Thread Size	DC	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)	Speed (min ⁻¹)	Feed (mm/min)	Feed per Tooth (mm/t)
M	M 3 ×0,5	2,4	4.642	37	0,01	7.958	64	0,01
	M 4 ×0,7	3,1	3.594	49	0,015	6.161	83	0,015
	M 5 ×0,8	4	2.785	38	0,017	4.775	65	0,017
	M 6 ×1	4,6	2.422	45	0,02	4.152	78	0,02
	M 8 ×1,25	6,2	1.797	49	0,03	3.080	83	0,03
	M 10 ×1,5	7,5	1.485	52	0,035	2.546	89	0,035
	M 12 ×1,75	9	1.238	56	0,045	2.122	95	0,045
	M 16 ×2	11,7	952	56	0,055	1.632	96	0,055
	M 18 ×2,5	14	796	42	0,06	1.364	73	0,06
	M 20 ×2,5	15,7	710	40	0,065	1.216	68	0,065
U	No. 8 - 32UNC	3,1	3.594	37	0,01	6.161	63	0,01
	No. 10 - 24UNC	3,7	3.011	42	0,015	5.162	72	0,015
	1/4 - 20UNC	4,55	2.449	69	0,025	4.197	119	0,025
	1/4 - 28UNF	4,55	2.449	69	0,025	4.197	119	0,025
	5/16 - 18UNC	5,7	1.955	66	0,03	3.351	113	0,03
	3/8 - 16UNC	6,7	1.663	69	0,035	2.851	118	0,035
	7/16 - 14UNC	7,7	1.447	71	0,04	2.480	122	0,04
	1/2 - 13UNC	9,2	1.211	60	0,045	2.076	103	0,045
	1/16 - 28	4,86	2.320	*1	0,025	3.976	*1	0,025
	1/8 - 28	5,76	1.954	*1	0,03	3.349	*1	0,03
Rc (PT)	1/4 - 19	7,98	1.411	*1	0,04	2.419	*1	0,04
	3/8 - 19	9,68	1.161	*1	0,045	1.990	*1	0,045
	1/2 - 14	11,61	969	*1	0,055	1.661	*1	0,055
	1 - 11	15,54	724	*1	0,065	1.240	*1	0,065
	1/16 - 27	4,86	2.321	*1	0,025	3.978	*1	0,025
NPT	1/8 - 27	5,76	1.954	*1	0,03	3.350	*1	0,03
	1/4 - 18	7,98	1.412	*1	0,04	2.420	*1	0,04
	3/8 - 18	9,68	1.161	*1	0,045	1.991	*1	0,045
	1/2 - 14	11,61	969	*1	0,055	1.661	*1	0,055
	1 - 11 1/2	15,54	723	*1	0,065	1.240	*1	0,065
*1. Values vary depending on the depth of hole to be machined.								
1. This cutting condition table shows standard values. When machining, it is recommended to use the program created by the NC code generator software ThreadPro.								
2. Please adjust the cutting conditions depending on the rigidity of machine, tool holders, and workpiece clamping.								
3. Tool vibrations should be kept at a minimum level for maximum accuracy.								
4. When machining magnesium alloy materials, please use the coolant oil recommended by the coolant oil manufacturer. Please also properly dispose the cutting chips to prevent fire hazards.								
5. Spindle rotation must be counterclockwise due to the left-hand cut configuration.								
* For titanium alloys and Ni-based alloys, the above condition table applies only when using a water-soluble cutting fluid and processing with a thread length approximately 1xD or an oil hole compatible size (oil hole column: ○ mark).								

Formula for calculating the feed rate of thread mill

$V_f = \frac{f \times z \times n \times (D_m - D_c)}{D_m} \text{ (mm/min)}$			V_f	Feed (mm/min)	z	Number of Flutes
			D_m	Actual Dia. (mm)	f	Feed (mm/t)
			D_c	Tool Dia. (mm)	n	Speed (min ⁻¹)
			Note Internal: –		External: +	

When programming a circular process, the feed rate at the tool center can be obtained by multiplying the linear cut feed rate with a coefficient. The formulas for calculating coefficients vary between external and internal thread cutting. The formula listed left are for calculating the tool feed rate for circular process, including calculating the coefficients to be used for multiplication with the linear-cut feed rate.