

# Miter Gears

## 20° Pressure Angle



Miter gears are ordinarily used as right angle drives, transmitting horsepower between intersecting shafts at a 1:1 ratio. They are used where high efficiency is required. Only miters of the same number of teeth, pitch, and pressure angle can be operated together. More than two miters may be used in sets, as in a differential.

The thrust of miter gears causes the gears to separate; therefore, ball bearings or roller bearings should be used rather than sleeve bearings. Provisions should be made using thrust bearings to absorb backward thrust.

All standard stock miter gears must be mounted at right angles (90 degrees) for proper tooth bearing.

All Martin miter and bevel gears are generated with the "coniflex" tooth form. A slight misalignment of gears is permissible because of the localized tooth bearing running lengthwise along the gear tooth.

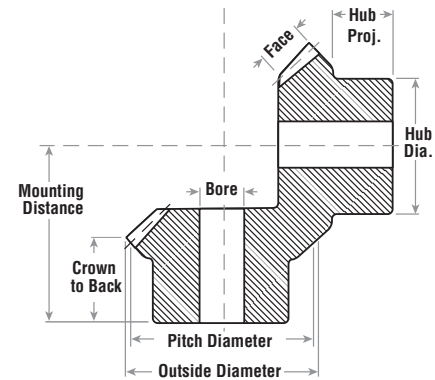
The mounting distance must be held in order to maintain proper backlash between gears. This will also insure that the ends of the gear teeth will be flush with each other. The use of a straight mineral oil as a lubricant is recommended for most miter gear applications.

Martin stock miter gears are manufactured from 1144 Carbon steel.

The "M" series is furnished unhardened with plain bore. The "HM" series is furnished hardened teeth with plain bore. The "HMK" series is furnished hardened teeth with keyway and setscrew for installation on the shaft.

Hardened miter gears have approximately 50% more horsepower capacity and provide greater gear wear than untreated gears.

All Martin miter gears are cut with the 20° pressure angle system. They will not operate with any other pressure angle system.



### Steel - Plain Bore — Unhardened Teeth

Number of Teeth	Part Number	Diameter		Face (Inches)	Bore (inches)		Mounting (Inches)	Hub (Inches)		Wt. Lb. (Approx.)
		Pitch	Outside		Diameter	Length		Diameter	Projection	

#### 4 Pitch

24	M424	6.00	6.36	1.33	1 1/2	3 9/16	5 1/2	4	1 15/16	14.4
24	M424A	6.00	6.36	1.33	1 3/4	3 9/16	5 1/2	4	1 15/16	13.7
28	M428	7.00	7.36	1.43	2	3 5/8	6	5	1 15/16	21.1

#### 5 Pitch

25	M525	5.00	5.29	1.10	1 3/8	3	4 5/8	3 1/2	1 3/4	8.5
25	M525A	5.00	5.29	1.10	1 1/2	3	4 5/8	3 1/2	1 3/4	8.3
25	M525B	5.00	5.29	1.10	1 3/4	3	4 5/8	3 1/2	1 3/4	7.8

#### 6 Pitch

24	M624	4.00	4.24	0.86	1 1/4	2 5/16	3 5/8	3	1 5/16	4.4
24	M624A	4.00	4.24	0.86	1 1/2	2 5/16	3 5/8	3	1 5/16	4.3
27	M627	4.50	4.74	0.96	1 1/4	2 5/8	4 1/8	3 1/4	1 1/2	6.3
27	M627A	4.50	4.74	0.96	1 1/2	2 5/8	4 1/8	3 1/4	1 1/2	5.9

#### 8 Pitch

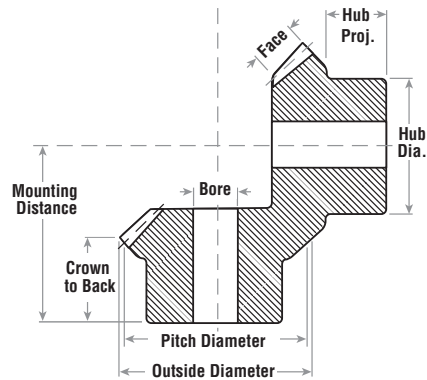
24	M824	3.00	3.18	0.64	3/4	1 37/64	2 9/16	1 3/4	13/16	1.5
24	M824A	3.00	3.18	0.64	1	1 49/64	2 3/4	2 1/2	1	2.1
24	M824B	3.00	3.18	0.64	1 1/4	1 49/64	2 3/4	2 1/2	1	1.9
28	M828	3.50	3.68	0.75	1	2 3/32	3 1/4	2 1/2	1 1/4	2.9
28	M828A	3.50	3.68	0.75	1 3/16	2 3/32	3 1/4	2 1/2	1 1/4	2.8
28	M828B	3.50	3.68	0.75	1 1/4	2 3/32	3 1/4	2 1/2	1 1/4	2.6
32	M832	4.00	4.18	0.84	1	2 9/32	3 5/8	3	1 1/8	4.8

#### 10 Pitch

20	M1020A	2.00	2.14	0.44	1/2	1 23/64	2	1 5/8	13/16	0.75
20	M1020B	2.00	2.14	0.44	5/8	1 23/64	2	1 5/8	13/16	0.72
20	M1020	2.00	2.14	0.44	3/4	1 23/64	2	1 5/8	13/16	0.67
20	M1020C	2.00	2.14	0.44	7/8	1 23/64	2	1 5/8	13/16	0.58
25	M1025	2.50	2.64	0.55	3/4	1 5/8	2 7/16	2	15/16	1.20
25	M1025A	2.50	2.64	0.55	7/8	1 5/8	2 7/16	2	15/16	1.20
25	M1025B	2.50	2.64	0.55	1	1 5/8	2 7/16	2	15/16	1.20
30	M1030	3.00	3.14	0.64	3/4	1 3/4	2 3/4	2	1	1.80

# Miter Gears

## 20° Pressure Angle



### Steel - Plain Bore — Unhardened Teeth

Number of Teeth	Part Number	Diameter		Face (Inches)	Bore (inches)		Mounting (Inches)	Hub (Inches)		Wt. Lb. (Approx.)
		Pitch	Outside		Diameter	Length		Diameter	Projection	
15	M1215	1.25	1.37	0.27	3/8	55/64	1 1/4	1	1/2	0.17
15	M1215A	1.25	1.37	0.27	7/16	55/64	1 1/4	1	1/2	0.16
15	M1215B	1.25	1.37	0.27	1/2	55/64	1 1/4	1	1/2	0.15
18	M1218	1.50	1.62	0.32	1/2	1 1/64	1 1/2	1 1/4	5/8	0.30
18	M1218A	1.50	1.62	0.32	5/8	1 1/64	1 1/2	1 1/4	5/8	0.25
18	M1218B	1.50	1.62	0.32	3/4	1 1/64	1 1/2	1 1/4	5/8	0.22
21	M1221	1.75	1.87	0.39	1/2	1 3/16	1 3/4	1 3/8	11/16	0.45
21	M1221A	1.75	1.87	0.39	9/16	1 3/16	1 3/4	1 3/8	11/16	0.45
21	M1221B	1.75	1.87	0.39	5/8	1 3/16	1 3/4	1 3/8	11/16	0.43
21	M1221C	1.75	1.87	0.39	3/4	1 3/16	1 3/4	1 3/8	11/16	0.38
24	M1224	2.00	2.12	0.43	1/2	1 7/32	1 7/8	1 1/2	11/16	0.62
30	M1230	2.50	2.62	0.54	5/8	1 31/64	2 5/16	1 3/4	27/32	1.10

### 14 Pitch

14	M1414	1.00	1.11	0.19	3/8	47/64	1 1/16	7/8	1/2	0.10
14	M1414A	1.00	1.11	0.19	7/16	47/64	1 1/16	7/8	1/2	0.09

### 16 Pitch

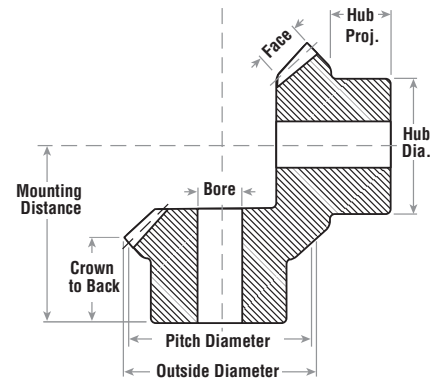
12	M1612	0.75	0.84	0.16	5/16	37/64	13/16	5/8	3/8	0.05
16	M1616	1.00	1.09	0.22	3/8	3/4	1 1/16	3/4	7/16	0.07
20	M1620	1.25	1.34	0.27	7/16	27/32	1 1/4	1	1/2	0.16
24	M1624	1.50	1.59	0.31	1/2	7/8	1 3/8	1	1/2	0.20

### 20 Pitch

20	M2020	1.00	1.07	0.23	3/8	13/16	1 1/8	3/4	1/2	0.06
25	M2025	1.25	1.32	0.25	3/8	3/4	1 3/16	1	3/8	0.14

### 24 Pitch

24	M2424	1.00	1.06	0.20	1/4	9/16	29/32	5/8	9/32	0.12
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### Steel - Plain Bore — Hardened Teeth

Number of Teeth	Part Number	Diameter		Face (Inches)	Bore (inches)		Mounting (Inches)	Hub (Inches)		Wt. Lb. (Approx.)
		Pitch	Outside		Diameter	Length		Diameter	Projection	

#### 4 Pitch

24	HM424	6.00	6.36	1.33	1 1/2	3 9/16	5 1/2	4	1 15/16	14.4
24	HM424A	6.00	6.36	1.33	1 3/4	3 9/16	5 1/2	4	1 15/16	13.7
28	HM428	7.00	7.36	1.43	2	3 5/8	6	5	1 15/16	21.1

#### 5 Pitch

25	HM525	5.00	5.29	1.10	1 3/8	3	4 5/8	3 1/2	1 3/4	8.5
25	HM525A	5.00	5.29	1.10	1 1/2	3	4 5/8	3 1/2	1 3/4	8.3
25	HM525B	5.00	5.29	1.10	1 3/4	3	4 5/8	3 1/2	1 3/4	7.5

#### 6 Pitch

24	HM624	4.00	4.24	0.86	1 1/4	2 5/16	3 5/8	3	1 5/16	4.4
24	HM624A	4.00	4.24	0.86	1 1/2	2 5/16	3 5/8	3	1 5/16	4.0
27	HM627	4.50	4.74	0.96	1 1/4	2 5/8	4 1/8	3 1/4	1 1/2	6.3
27	HM627A	4.50	4.74	0.96	1 1/2	2 5/8	4 1/8	3 1/4	1 1/2	5.9

#### 8 Pitch

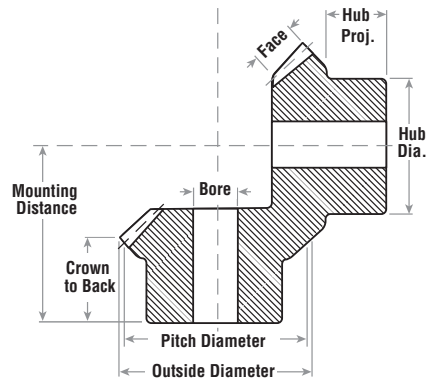
24	HM824	3.00	3.18	0.64	3/4	1 37/64	2 9/16	1 3/4	13/16	1.5
24	HM824A	3.00	3.18	0.64	1	1 49/64	2 3/4	2 1/2	1	2.1
24	HM824B	3.00	3.18	0.64	1 1/4	1 49/64	2 3/4	2 1/2	1	2.6
28	HM828	3.50	3.68	0.75	1	2 3/32	3 1/4	2 1/2	1 1/4	3.0
28	HM828A	3.50	3.68	0.75	1 3/16	2 3/32	3 1/4	2 1/2	1 1/4	2.8
28	HM828B	3.50	3.68	0.75	1 1/4	2 3/32	3 1/4	2 1/2	1 1/4	2.6
32	HM832	4.00	4.18	0.85	1	2 9/32	3 5/8	3	1 1/8	4.7

#### 10 Pitch

20	HM1020A	2.00	2.14	0.44	1/2	1 23/64	2	1 5/8	13/16	0.76
20	HM1020B	2.00	2.14	0.44	5/8	1 23/64	2	1 5/8	13/16	0.70
20	HM1020	2.00	2.14	0.44	3/4	1 23/64	2	1 5/8	13/16	0.64
20	HM1020C	2.00	2.14	0.44	7/8	1 23/64	2	1 5/8	13/16	0.58
25	HM1025	2.50	2.64	0.55	3/4	1 5/8	2 7/16	2	15/16	1.30
25	HM1025A	2.50	2.64	0.55	7/8	1 5/8	2 7/16	2	15/16	1.20
25	HM1025B	2.50	2.64	0.55	1	1 5/8	2 7/16	2	15/16	1.20
30	HM1030	3.00	3.14	0.64	3/4	1 3/4	2 3/4	2	1	1.80

# Miter Gears

## 20° Pressure Angle



### Steel - Plain Bore — Hardened Teeth

Number of Teeth	Part Number	Diameter		Face (Inches)	Bore (inches)		Mounting (Inches)	Hub (Inches)		Wt. Lb. (Approx.)
		Pitch	Outside		Diameter	Length		Diameter	Projection	

#### 12 Pitch

15	HM1215	1.25	1.37	0.27	3/8	55/64	1 1/4	1	1/2	0.15
15	HM1215B	1.25	1.37	0.27	1/2	55/64	1 1/4	1	1/2	0.15
18	HM1218	1.50	1.62	0.32	1/2	1 1/64	1 1/2	1 1/4	5/8	0.30
18	HM1218A	1.50	1.62	0.32	5/8	1 1/64	1 1/2	1 1/4	5/8	0.25
18	HM1218B	1.50	1.62	0.32	3/4	1 1/64	1 1/2	1 1/4	5/8	0.22
21	HM1221	1.75	1.87	0.39	1/2	1 3/16	1 3/4	1 3/8	11/16	0.22
21	HM1221B	1.75	1.87	0.39	5/8	1 3/16	1 3/4	1 3/8	11/16	0.42
24	HM1224	2.00	2.12	0.43	1/2	1 7/32	1 7/8	1 1/2	11/16	0.62
30	HM1230	2.50	2.62	0.54	5/8	1 31/64	2 5/16	1 3/4	27/32	1.10

#### 14 Pitch

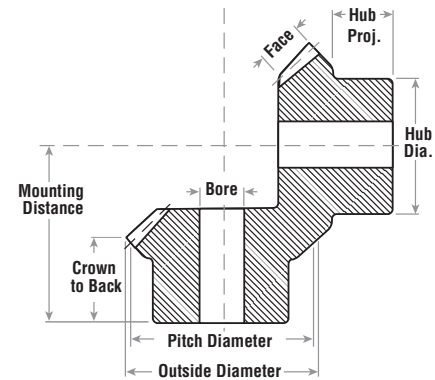
14	HM1414	1.00	1.11	0.19	3/8	47/64	1 1/16	7/8	1/2	0.10
14	HM1414A	1.00	1.11	0.19	7/16	47/64	1 1/16	7/8	1/2	0.10

#### 16 Pitch

16	HM1616	1.00	1.09	0.22	3/8	3/4	1 1/16	3/4	7/16	0.07
24	HM1624	1.50	1.59	0.31	1/2	7/8	13/8	1	1/2	0.20

#### 24 Pitch

24	HM2424	1.00	1.06	0.20	1/4	9/16	29/32	5/8	9/32	0.06
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### Steel - Furnished with Keyway and Set Screw — Hardened Teeth

Number of Teeth	Part Number	Diameter		Face (Inches)	Bore (inches)		Mounting (Inches)	Hub (Inches)		Wt. Lb. (Approx.)
		Pitch	Outside		Diameter	Length		Diameter	Projection	

#### 4 Pitch

24	HMK424A	6.00	6.36	1.33	1 3/4	3 9/16	5 1/2	4	1 15/16	13.7
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#### 5 Pitch

25	HMK525	5.00	5.29	1.10	1 3/8	3	4 5/8	3 1/2	1 3/4	8.5
25	HMK525B	5.00	5.29	1.10	1 3/4	3	4 5/8	3 1/2	1 3/4	7.5

#### 6 Pitch

24	HMK624	4.00	4.24	0.86	1 1/4	2 5/16	3 5/8	3	1 5/16	4.4
24	HMK624A	4.00	4.24	0.86	1 1/2	2 5/16	3 5/8	3	1 5/16	4.0
27	HMK627	4.50	4.74	0.96	1 1/4	2 5/8	4 1/8	3 1/4	1 1/2	6.3
27	HMK627A	4.50	4.74	0.96	1 1/2	2 5/8	4 1/8	3 1/4	1 1/2	5.9

#### 8 Pitch

24	HMK824	3.00	3.18	0.64	3/4	1 37/64	2 9/16	1 3/4	13/16	1.5
24	HMK824A	3.00	3.18	0.64	1	1 49/64	2 3/4	2 1/2	1	2.1
24	HMK824B	3.00	3.18	0.64	1 1/4	1 49/64	2 3/4	2 1/2	1	1.8
28	HMK828	3.50	3.68	0.75	1	2 3/32	3 1/4	2 1/2	1 1/4	2.9
28	HMK828A	3.50	3.68	0.75	1 3/16	2 3/32	3 1/4	2 1/2	1 1/4	2.7
28	HMK828B	3.50	3.68	0.75	1 1/4	2 3/32	3 1/4	2 1/2	1 1/4	2.6

#### 10 Pitch

20	HMK1020A	2.00	2.14	0.44	1/2	1 23/64	2	1 5/8	13/16	0.74
20	HMK1020B	2.00	2.14	0.44	5/8	1 23/64	2	1 5/8	13/16	0.70
20	HMK1020	2.00	2.14	0.44	3/4	1 23/64	2	1 5/8	13/16	0.63
20	HMK1020C	2.00	2.14	0.44	7/8	1 23/64	2	1 5/8	13/16	0.58
25	HMK1025	2.50	2.64	0.55	3/4	1 5/8	2 7/16	2	15/16	1.30
25	HMK1025A	2.50	2.64	0.55	7/8	1 5/8	2 7/16	2	15/16	1.20
25	HMK1025B	2.50	2.64	0.55	1	1 5/8	2 7/16	2	15/16	1.10

#### 12 Pitch

15	HMK1215B	1.25	1.37	0.27	1/2	55/64	1 1/4	1	1/2	0.14
18	HMK1218A	1.50	1.62	0.32	5/8	1 1/64	1 1/2	1 1/4	5/8	0.25
21	HMK1221B	1.75	1.87	0.39	5/8	1 3/16	1 3/4	1 3/8	11/16	0.41
30	HMK1230	2.50	2.62	0.54	5/8	1 31/64	2 5/16	1 3/4	27/32	1.10

#### 16 Pitch

16	HMK1616	1.00	1.09	0.22	3/8	3/4	1 1/16	3/4	7/16	0.07
24	HMK1624	1.50	1.59	0.31	1/2	7/8	1 3/8	1	1/2	0.20

# Miter Gear Horsepower Ratings



## Steel

Part Number	Revolutions Per Minute									
	10	25	50	100	200	300	600	900	1200	1800
M424	0.80	1.90	3.60	6.40	10.60	13.5	18.8	21.5	23.0	
HM424	1.40	3.33	6.30	11.20	18.60	23.6	33.0	38.0	40.0	
M428	1.07	2.50	4.80	8.40	13.60	17.2	23.3	26.5	28.5	
HM428	1.90	4.50	8.40	14.70	23.80	30.0	40.0	46.0	50.0	
M525	0.45	1.05	2.00	3.70	6.30	8.1	11.6	13.6	15.0	
HM525	0.75	1.90	3.60	6.50	11.00	14.2	20.0	24.0	26.0	
M624	0.25	0.55	1.10	2.00	3.50	4.6	6.9	8.2	19.0	10.2
HM624	0.40	1.00	1.90	3.50	6.10	8.0	12.0	14.5	16.0	18.0
M627	0.30	0.75	1.40	2.50	4.30	5.7	8.5	9.9	11.0	12.0
HM627	0.50	1.33	2.50	4.40	7.50	10.0	1.5	17.5	19.0	21.0
M824	0.10	0.25	0.50	0.90	1.50	2.1	3.3	4.0	4.5	5.3
HM824	0.20	0.40	0.80	1.50	2.60	3.7	5.8	7.0	8.0	9.3
M828	0.15	0.33	0.70	1.20	2.20	2.9	4.4	5.3	6.0	6.8
HM828	0.25	0.60	1.20	2.10	3.90	5.0	7.7	9.3	10.5	12.0
M832	0.20	0.45	0.90	1.60	2.80	3.7	5.5	6.5	7.2	8.0
HM832	0.33	0.80	1.50	2.80	4.90	6.5	9.6	11.4	12.5	14.2
M1020	0.03	0.08	0.20	0.30	0.60	0.8	1.3	1.7	2.0	2.4
HM1020	0.05	0.15	0.30	0.50	1.00	1.4	2.3	3.0	3.5	4.2
M1025	0.06	0.15	0.30	0.50	0.90	1.3	2.0	2.5	2.9	3.5
HM1025	0.10	0.25	0.50	0.90	1.60	2.3	3.5	4.4	5.0	6.0
M1030	0.08	0.20	0.40	0.70	1.30	1.8	2.8	3.5	3.9	4.5
HM1030	0.15	0.33	0.70	1.30	2.30	3.2	4.9	6.1	6.8	8.0
M1215	0.01	0.02	0.05	0.10	0.20	0.3	0.5	0.6	0.8	0.9
HM1215	0.02	0.04	0.10	0.17	0.33	0.4	0.8	1.0	1.3	1.6
M1218	0.01	0.03	0.08	0.14	0.25	0.4	0.7	0.9	1.0	1.3
HM1218	0.02	0.05	0.15	0.25	0.47	0.7	1.1	1.5	1.8	2.2
M1221	0.02	0.05	0.11	0.20	0.40	0.5	0.9	1.2	1.4	1.7
HM1221	0.04	0.10	0.20	0.33	0.70	1.0	1.6	2.1	2.5	3.0
M1224	0.03	0.07	0.15	0.25	0.50	0.7	1.2	1.5	1.7	2.0
HM1224	0.05	0.12	0.25	0.47	0.90	1.2	2.1	2.6	3.0	3.5
M1230	0.05	0.12	0.25	0.44	0.80	1.1	1.8	2.2	2.5	3.0
HM1230	0.09	0.21	0.40	0.75	1.40	1.9	3.2	4.0	4.4	5.3
M1414		0.01	0.02	0.05	0.09	0.1	0.2	0.3	0.4	0.5
HM1414		0.02	0.04	0.09	0.16	0.2	0.4	0.6	0.7	0.9
M1616		0.01	0.02	0.05	0.09	0.1	0.2	0.3	0.4	0.5
HM1616		0.02	0.04	0.09	0.16	0.2	0.4	0.6	0.7	0.9
M1620		0.02	0.04	0.08	0.14	0.2	0.4	0.5	0.6	0.8
HM1620		0.04	0.07	0.15	0.25	0.4	0.7	0.9	1.0	1.3
M1624		0.03	0.06	0.12	0.20	0.3	0.5	0.7	0.8	1.0
HM1624		0.05	0.10	0.21	0.40	0.5	0.9	1.2	1.4	1.8
M2020		0.01	0.02	0.04	0.08	0.1	0.2	0.2	0.4	0.5
HM2020		0.02	0.04	0.07	0.14	0.2	0.4	0.5	0.6	0.8
M2025		0.02	0.03	0.06	0.12	0.2	0.3	0.4	0.5	0.6
HM2025		0.04	0.05	0.10	0.21	0.3	0.5	0.7	0.9	1.0

Ratings listed to right of dark line exceed recommended pitch line velocity.