# 4G MILL END MILLS

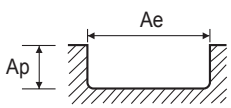
## RECOMMENDED CUTTING CONDITIONS

## GMF18 SERIES — 2FLUTE CORNER RADIUS - SLOTTING

DIA. = Diameter
LBS = Length Below Shank
RPM = rev./min.
FEED = inch/min.

| ISO | VDI 3323 | Material Description | Ae | Ap | Parameter | Diameter (Ø) 3/64 | 1/16 | 5/64 | 1/8 | 9/64 | 13/64 | 1/4 | 5/16 | 3/8 | 1/2 | 9/16 | 5/8 | 3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 1-8 | Non-alloy steel Low alloy steel | 1.0D | 0.2D | SFM(Vc) | 305 | 340 | 370 | 410 | 430 | 475 | 490 | 490 | 520 | 510 | 515 | 505 | 510 |
| | | | | | IPT(fz) | .0002 | .0002 | .0003 | .0004 | .0005 | .0009 | .0012 | .0018 | .0021 | .0020 | .0021 | .0023 | .0022 |
| | | | | | RPM | 25000 | 20800 | 18100 | 12500 | 11700 | 8900 | 7500 | 6000 | 5300 | 3900 | 3500 | 3100 | 2600 |
| | | | | | IPM(FEED) | 10 | 9 | 10 | 10 | 12 | 16 | 19 | 22 | 22 | 16 | 15 | 14 | 12 |
| | 9 | Low alloy steel | 1.0D | 0.2D | SFM(Vc) | 195 | 210 | 240 | 265 | 280 | 300 | 310 | 315 | 340 | 345 | 350 | 345 | 340 |
| | | | | | IPT(fz) | .0001 | .0002 | .0002 | .0003 | .0004 | .0007 | .0010 | .0013 | .0015 | .0016 | .0016 | .0016 | .0014 |
| | | | | | RPM | 15870 | 12760 | 11650 | 8090 | 7540 | 5620 | 4760 | 3830 | 3440 | 2630 | 2390 | 2120 | 1720 |
| | | | | | IPM(FEED) | 4 | 4 | 5 | 5 | 6 | 8 | 9 | 10 | 10 | 9 | 8 | 7 | 5 |
| | 10-11.1 | High alloyed steel, and tool steel | 1.0D | 0.2D | SFM(Vc) | 305 | 340 | 370 | 410 | 430 | 475 | 490 | 490 | 520 | 510 | 515 | 505 | 510 |
| | | | | | IPT(fz) | .0002 | .0002 | .0003 | .0004 | .0005 | .0009 | .0012 | .0018 | .0021 | .0020 | .0021 | .0023 | .0022 |
| | | | | | RPM | 25000 | 20800 | 18100 | 12500 | 11700 | 8900 | 7500 | 6000 | 5300 | 3900 | 3500 | 3100 | 2600 |
| | | | | | IPM(FEED) | 10 | 9 | 10 | 10 | 12 | 16 | 19 | 22 | 22 | 16 | 15 | 14 | 12 |
| | 11.2 | | 1.0D | 0.2D | SFM(Vc) | 195 | 210 | 240 | 265 | 280 | 300 | 310 | 315 | 340 | 345 | 350 | 345 | 340 |
| | | | | | IPT(fz) | .0001 | .0002 | .0002 | .0003 | .0004 | .0007 | .0010 | .0013 | .0015 | .0016 | .0016 | .0016 | .0014 |
| | | | | | RPM | 15870 | 12760 | 11650 | 8090 | 7540 | 5620 | 4760 | 3830 | 3440 | 2630 | 2390 | 2120 | 1720 |
| | | | | | IPM(FEED) | 4 | 4 | 5 | 5 | 6 | 8 | 9 | 10 | 10 | 9 | 8 | 7 | 5 |
| K | 15-20 | Grey cast iron Nodular cast iron Malleable cast iron | 1.0D | 0.2D | SFM(Vc) | 305 | 340 | 370 | 410 | 430 | 475 | 490 | 490 | 520 | 510 | 515 | 505 | 510 |
| | | | | | IPT(fz) | .0002 | .0002 | .0003 | .0004 | .0005 | .0009 | .0012 | .0018 | .0021 | .0020 | .0021 | .0023 | .0022 |
| | | | | | RPM | 25000 | 20800 | 18100 | 12500 | 11700 | 8900 | 7500 | 6000 | 5300 | 3900 | 3500 | 3100 | 2600 |
| | | | | | IPM(FEED) | 10 | 9 | 10 | 10 | 12 | 16 | 19 | 22 | 22 | 16 | 15 | 14 | 12 |
| H | 38.1-38.2 | Hardened steel | 1.0D | 0.2D | SFM(Vc) | 120 | 130 | 150 | 165 | 175 | 195 | 205 | 210 | 210 | 210 | 215 | 210 | 205 |
| | | | | | IPT(fz) | .0001 | .0001 | .0002 | .0003 | .0003 | .0005 | .0007 | .0009 | .0012 | .0012 | .0012 | .0012 | .0012 |
| | | | | | RPM | 9830 | 8030 | 7260 | 4990 | 4690 | 3680 | 3100 | 2540 | 2120 | 1590 | 1450 | 1290 | 1050 |
| | | | | | IPM(FEED) | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 4 | 4 | 3 | 3 |
| | 40 | Chilled Cast Iron | 1.0D | 0.2D | SFM(Vc) | 195 | 210 | 240 | 265 | 280 | 300 | 310 | 315 | 340 | 345 | 350 | 345 | 340 |
| | | | | | IPT(fz) | .0001 | .0002 | .0002 | .0003 | .0004 | .0007 | .0010 | .0013 | .0015 | .0016 | .0016 | .0016 | .0014 |
| | | | | | RPM | 15870 | 12760 | 11650 | 8090 | 7540 | 5620 | 4760 | 3830 | 3440 | 2630 | 2390 | 2120 | 1720 |
| | | | | | IPM(FEED) | 4 | 4 | 5 | 5 | 6 | 8 | 9 | 10 | 10 | 9 | 8 | 7 | 5 |
| | 41 | Hardened Cast Iron | 1.0D | 0.2D | SFM(Vc) | 120 | 130 | 150 | 165 | 175 | 195 | 205 | 210 | 210 | 210 | 215 | 210 | 205 |
| | | | | | IPT(fz) | .0001 | .0001 | .0002 | .0003 | .0003 | .0005 | .0007 | .0009 | .0012 | .0012 | .0012 | .0012 | .0012 |
| | | | | | RPM | 9830 | 8030 | 7260 | 4990 | 4690 | 3680 | 3100 | 2540 | 2120 | 1590 | 1450 | 1290 | 1050 |
| | | | | | IPM(FEED) | 2 | 2 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 4 | 4 | 3 | 3 |

SFM = Surface Feet per Minute
RPM = Revolutions Per Minute
IPT = Inches Per Tooth
IPM = Inches Per Minute
Ap : Inch (Axial Depth of Cut)
Ae : Inch (Radial Depth of Cut)



# 4G MILL END MILLS

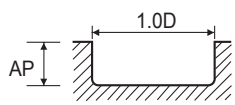
## RECOMMENDED CUTTING CONDITIONS

## GMF19 SERIES — 2FLUTE CORNER RADIUS - SLOTTING

DIA. = Diameter
LBS = Length Below Shank
RPM = rev./min.
FEED = inch/min.

| ISO | VDI 3323 | Material Description | Parameter | Diameter (Ø) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .008 | .012 | .012 | .015 | .015 | .015 | .015 | .020 | .020 | .020 | .020 | .020 | .024 | .024 |
| | | | LBS | 3/64 | 3/64 | 5/64 | 3/64 | 1/16 | 5/64 | 3/32 | 3/64 | 1/16 | 5/64 | 1/8 | 5/32 | 5/64 | 1/8 |
| P | 1-8 | Non-alloy steel Low alloy steel | SFM(Vc) | 95 | 155 | 140 | 205 | 205 | 185 | 185 | 220 | 220 | 220 | 200 | 200 | 225 | 205 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 44290 | 49210 | 44290 | 52490 | 52490 | 47240 | 47240 | 42320 | 42320 | 42320 | 38090 | 38090 | 35830 | 32240 |
| | | | IPM(FEED) | 5 | 8 | 6 | 8 | 8 | 7 | 7 | 9 | 9 | 9 | 7 | 7 | 10 | 8 |
| | | | Ap | .0006 | .0017 | .0009 | .0021 | .0021 | .0012 | .0012 | .0040 | .0028 | .0028 | .0016 | .0016 | .0033 | .0019 |
| | 9 | Low alloy steel | SFM(Vc) | 65 | 100 | 90 | 130 | 130 | 120 | 120 | 145 | 145 | 145 | 130 | 130 | 150 | 135 |
| | | | IPT(fz) | .0000 | .0001 | .0000 | .0001 | .0001 | .0000 | .0000 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 30560 | 31500 | 28350 | 33600 | 33600 | 30240 | 30240 | 27560 | 27560 | 27560 | 24800 | 24800 | 23620 | 21260 |
| | | | IPM(FEED) | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 |
| | | | Ap | .0005 | .0013 | .0007 | .0016 | .0016 | .0009 | .0009 | .0030 | .0021 | .0021 | .0012 | .0012 | .0025 | .0015 |
| | 10-11.1 | High alloyed steel, and tool steel | SFM(Vc) | 95 | 155 | 140 | 205 | 205 | 185 | 185 | 220 | 220 | 220 | 200 | 200 | 225 | 205 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 44290 | 49210 | 44290 | 52490 | 52490 | 47240 | 47240 | 42320 | 42320 | 42320 | 38090 | 38090 | 35830 | 32240 |
| | | | IPM(FEED) | 5 | 8 | 6 | 8 | 8 | 7 | 7 | 9 | 9 | 9 | 7 | 7 | 10 | 8 |
| | | | Ap | .0006 | .0017 | .0009 | .0021 | .0021 | .0012 | .0012 | .0040 | .0028 | .0028 | .0016 | .0016 | .0033 | .0019 |
| | 11.2 | | SFM(Vc) | 65 | 100 | 90 | 130 | 130 | 120 | 120 | 145 | 145 | 145 | 130 | 130 | 150 | 135 |
| | | | IPT(fz) | .0000 | .0001 | .0000 | .0001 | .0001 | .0000 | .0000 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 30560 | 31500 | 28350 | 33600 | 33600 | 30240 | 30240 | 27560 | 27560 | 27560 | 24800 | 24800 | 23620 | 21260 |
| | | | IPM(FEED) | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 |
| | | | Ap | .0005 | .0013 | .0007 | .0016 | .0016 | .0009 | .0009 | .0030 | .0021 | .0021 | .0012 | .0012 | .0025 | .0015 |
| K | 15-20 | Grey cast iron Nodular cast iron Malleable cast iron | SFM(Vc) | 95 | 155 | 140 | 205 | 205 | 185 | 185 | 220 | 220 | 220 | 200 | 200 | 225 | 205 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 44290 | 49210 | 44290 | 52490 | 52490 | 47240 | 47240 | 42320 | 42320 | 42320 | 38090 | 38090 | 35830 | 32240 |
| | | | IPM(FEED) | 5 | 8 | 6 | 8 | 8 | 7 | 7 | 9 | 9 | 9 | 7 | 7 | 10 | 8 |
| | | | Ap | .0006 | .0017 | .0009 | .0021 | .0021 | .0012 | .0012 | .0040 | .0028 | .0028 | .0016 | .0016 | .0033 | .0019 |
| H | 38.1-38.2 | Hardened steel | SFM(Vc) | 40 | 60 | 55 | 80 | 80 | 75 | 75 | 90 | 90 | 90 | 80 | 80 | 90 | 80 |
| | | | IPT(fz) | .0000 | .0001 | .0000 | .0000 | .0000 | .0000 | .0000 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 18740 | 19690 | 17720 | 21000 | 21000 | 18900 | 18900 | 16830 | 16830 | 16830 | 15150 | 15150 | 14270 | 12840 |
| | | | IPM(FEED) | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| | | | Ap | .0004 | .0010 | .0006 | .0013 | .0013 | .0007 | .0007 | .0024 | .0017 | .0017 | .0009 | .0009 | .0020 | .0011 |
| | 40 | Chilled Cast Iron | SFM(Vc) | 65 | 100 | 90 | 130 | 130 | 120 | 120 | 145 | 145 | 145 | 130 | 130 | 150 | 135 |
| | | | IPT(fz) | .0000 | .0001 | .0000 | .0001 | .0001 | .0000 | .0000 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 30560 | 31500 | 28350 | 33600 | 33600 | 30240 | 30240 | 27560 | 27560 | 27560 | 24800 | 24800 | 23620 | 21260 |
| | | | IPM(FEED) | 2 | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 4 | 4 |
| | | | Ap | .0005 | .0013 | .0007 | .0016 | .0016 | .0009 | .0009 | .0030 | .0021 | .0021 | .0012 | .0012 | .0025 | .0015 |
| | 41 | Hardened Cast Iron | SFM(Vc) | 40 | 60 | 55 | 80 | 80 | 75 | 75 | 90 | 90 | 90 | 80 | 80 | 90 | 80 |
| | | | IPT(fz) | .0000 | .0001 | .0000 | .0000 | .0000 | .0000 | .0000 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 18740 | 19690 | 17720 | 21000 | 21000 | 18900 | 18900 | 16830 | 16830 | 16830 | 15150 | 15150 | 14270 | 12840 |
| | | | IPM(FEED) | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| | | | Ap | .0004 | .0010 | .0006 | .0013 | .0013 | .0007 | .0007 | .0024 | .0017 | .0017 | .0009 | .0009 | .0020 | .0011 |

SFM = Surface Feet per Minute
RPM = Revolutions Per Minute
IPT = Inches Per Tooth
IPM = Inches Per Minute
Ap : Inch (Axial Depth of Cut)
Ae : Inch (Radial Depth of Cut)



# 4G MILL END MILLS

## RECOMMENDED CUTTING CONDITIONS

## GMF19 SERIES 2FLUTE CORNER RADIUS - SLOTTING

| ISO | VDI 3323 | Material Description | Parameter | Diameter (Ø) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | .024 | .024 | .031 | .031 | .031 | .031 | 3/64 | 3/64 | 3/64 | 3/64 | 3/64 | 1/16 | 1/16 | 1/16 |
| | | | LBS | 5/32 | 1/4 | 5/64 | 5/32 | 1/4 | 5/16 | 1/8 | 5/32 | 1/4 | 5/16 | 3/8 | 5/32 | 1/4 | 5/16 |
| P | 1-8 | Non-alloy steel Low alloy steel | SFM(Vc) | 205 | 180 | 300 | 270 | 270 | 240 | 340 | 340 | 305 | 305 | 305 | 410 | 410 | 410 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0001 | .0001 | .0001 | .0002 | .0002 | .0002 |
| | | | RPM | 32240 | 28660 | 36980 | 33280 | 33280 | 29590 | 27800 | 27800 | 25020 | 25020 | 25020 | 24940 | 24940 | 24940 |
| | | | IPM(FEED) | 8 | 6 | 10 | 8 | 8 | 7 | 9 | 9 | 8 | 8 | 8 | 11 | 11 | 11 |
| | | | Ap | .0019 | .0012 | .0062 | .0025 | .0015 | .0015 | .0094 | .0066 | .0037 | .0037 | .0037 | .0125 | .0087 | .0087 |
| | 9 | Low alloy steel | SFM(Vc) | 135 | 120 | 200 | 180 | 180 | 160 | 225 | 225 | 200 | 200 | 200 | 250 | 250 | 250 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0002 |
| | | | RPM | 21260 | 18900 | 24380 | 21950 | 21950 | 19510 | 18140 | 18140 | 16330 | 16330 | 16330 | 15310 | 15310 | 15310 |
| | | | IPM(FEED) | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 5 |
| | | | Ap | .0015 | .0009 | .0046 | .0019 | .0012 | .0012 | .0070 | .0049 | .0028 | .0028 | .0028 | .0094 | .0066 | .0066 |
| | 10-11.1 | High alloyed steel, and tool steel | SFM(Vc) | 205 | 180 | 300 | 270 | 270 | 240 | 340 | 340 | 305 | 305 | 305 | 410 | 410 | 410 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0001 | .0001 | .0001 | .0002 | .0002 | .0002 |
| | | | RPM | 32240 | 28660 | 36980 | 33280 | 33280 | 29590 | 27800 | 27800 | 25020 | 25020 | 25020 | 24940 | 24940 | 24940 |
| | | | IPM(FEED) | 8 | 6 | 10 | 8 | 8 | 7 | 9 | 9 | 8 | 8 | 8 | 11 | 11 | 11 |
| | | | Ap | .0019 | .0012 | .0062 | .0025 | .0015 | .0015 | .0094 | .0066 | .0037 | .0037 | .0037 | .0125 | .0087 | .0087 |
| | 11.2 | | SFM(Vc) | 135 | 120 | 200 | 180 | 180 | 160 | 225 | 225 | 200 | 200 | 200 | 250 | 250 | 250 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0002 |
| | | | RPM | 21260 | 18900 | 24380 | 21950 | 21950 | 19510 | 18140 | 18140 | 16330 | 16330 | 16330 | 15310 | 15310 | 15310 |
| | | | IPM(FEED) | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 5 |
| | | | Ap | .0015 | .0009 | .0046 | .0019 | .0012 | .0012 | .0070 | .0049 | .0028 | .0028 | .0028 | .0094 | .0066 | .0066 |
| K | 15-20 | Grey cast iron Nodular cast iron Malleable cast iron | SFM(Vc) | 205 | 180 | 300 | 270 | 270 | 240 | 340 | 340 | 305 | 305 | 305 | 410 | 410 | 410 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0001 | .0001 | .0001 | .0002 | .0002 | .0002 |
| | | | RPM | 32240 | 28660 | 36980 | 33280 | 33280 | 29590 | 27800 | 27800 | 25020 | 25020 | 25020 | 24940 | 24940 | 24940 |
| | | | IPM(FEED) | 8 | 6 | 10 | 8 | 8 | 7 | 9 | 9 | 8 | 8 | 8 | 11 | 11 | 11 |
| | | | Ap | .0019 | .0012 | .0062 | .0025 | .0015 | .0015 | .0094 | .0066 | .0037 | .0037 | .0037 | .0125 | .0087 | .0087 |
| H | 38.1-38.2 | Hardened steel | SFM(Vc) | 80 | 70 | 120 | 110 | 110 | 95 | 135 | 135 | 120 | 120 | 120 | 160 | 160 | 160 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 12840 | 11420 | 14730 | 13260 | 13260 | 11790 | 11090 | 11090 | 9980 | 9980 | 9980 | 9640 | 9640 | 9640 |
| | | | IPM(FEED) | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| | | | Ap | .0011 | .0007 | .0037 | .0015 | .0009 | .0009 | .0056 | .0039 | .0022 | .0022 | .0022 | .0075 | .0052 | .0052 |
| | 40 | Chilled Cast Iron | SFM(Vc) | 135 | 120 | 200 | 180 | 180 | 160 | 225 | 225 | 200 | 200 | 200 | 250 | 250 | 250 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0002 | .0002 | .0002 |
| | | | RPM | 21260 | 18900 | 24380 | 21950 | 21950 | 19510 | 18140 | 18140 | 16330 | 16330 | 16330 | 15310 | 15310 | 15310 |
| | | | IPM(FEED) | 4 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 5 |
| | | | Ap | .0015 | .0009 | .0046 | .0019 | .0012 | .0012 | .0070 | .0049 | .0028 | .0028 | .0028 | .0094 | .0066 | .0066 |
| | 41 | Hardened Cast Iron | SFM(Vc) | 80 | 70 | 120 | 110 | 110 | 95 | 135 | 135 | 120 | 120 | 120 | 160 | 160 | 160 |
| | | | IPT(fz) | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 | .0001 |
| | | | RPM | 12840 | 11420 | 14730 | 13260 | 13260 | 11790 | 11090 | 11090 | 9980 | 9980 | 9980 | 9640 | 9640 | 9640 |
| | | | IPM(FEED) | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| | | | Ap | .0011 | .0007 | .0037 | .0015 | .0009 | .0009 | .0056 | .0039 | .0022 | .0022 | .0022 | .0075 | .0052 | .0052 |

SFM = Surface Feet per Minute
RPM = Revolutions Per Minute
IPT = Inches Per Tooth
IPM = Inches Per Minute
Ap : Inch (Axial Depth of Cut)
Ae : Inch (Radial Depth of Cut)