MORSE®
THE M. K. MORSE COMPANY

# OPERATOR'S Guide to Band Sawing

MADE IN U.S.A.

## Tooth Selection

***Cut costs with the right choice.***

For maximum cutting efficiency and lowest cost per cut, it is important to select the blade with the right number of teeth per inch (TPI) for the material being cut. The material size and shape dictate tooth selection.

## Consider this:

**(1)** ***The width of the cut:***
That is, the distance in the cut that each tooth must travel from the point it enters the workpiece until it leaves the workpiece.

**(2)** ***The shape of the workpiece.***

## Chart Usage

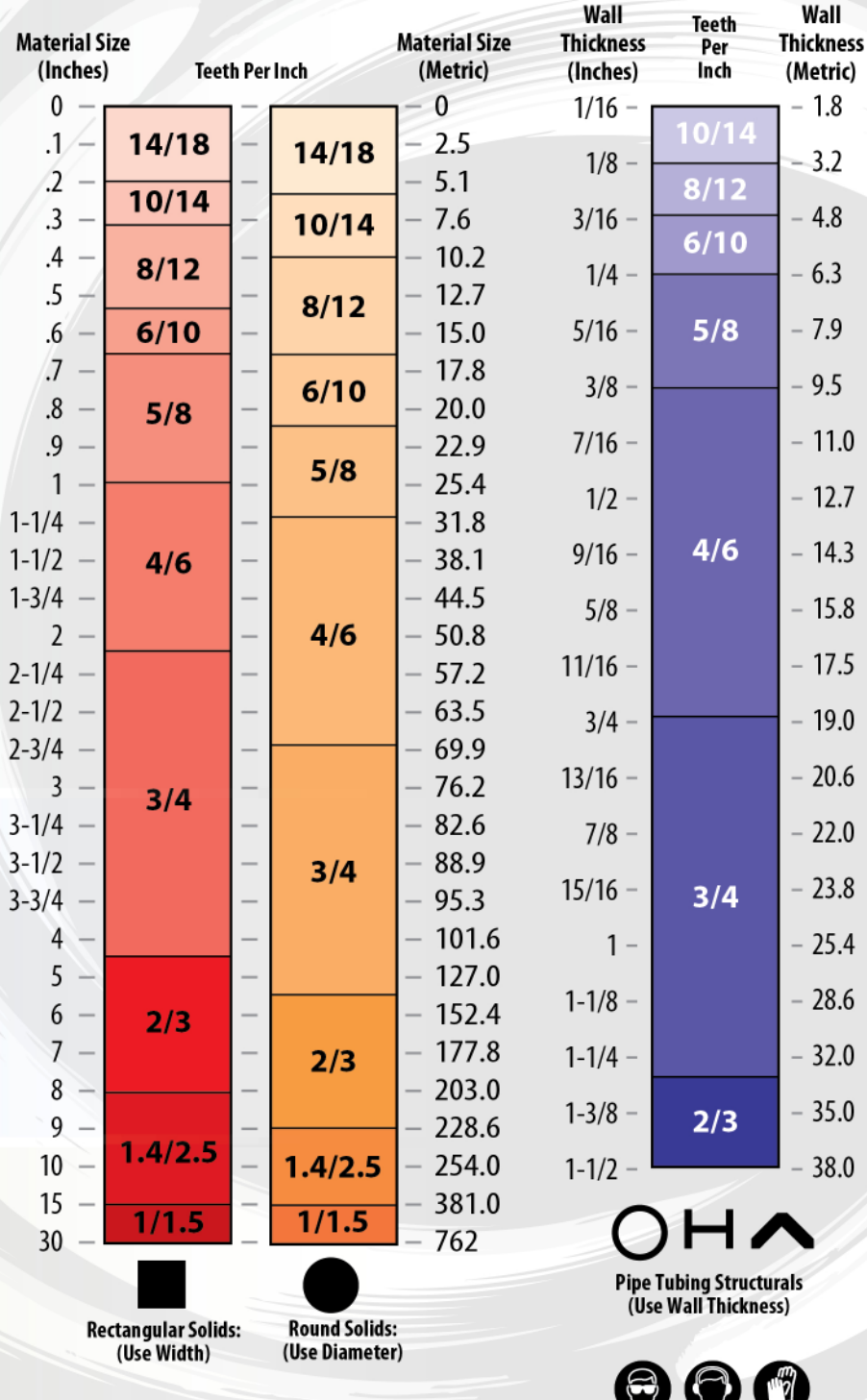
Select a pitch based on the chart to the right. Find material dimension on chart and move right for appropriate teeth per inch.

For angle, tubing, pipe, and other structural shapes, find the wall thickness in size column and move right for tooth size.

## Cutting Speed – Structurals Rule of Thumb

When cutting structurals use a cutting speed of:

*250-325 S.F.M. Wet • 200-250 S.F.M. Dry*



# M. K. MORSE BAND SAW PRODUCT OVERVIEW

This page provides a general overview of the types of M. K. Morse band saw blades best suited to different cutting applications.

## MORSE BI-METAL BAND SAW BLADE APPLICATION OVERVIEW

Selection Based Upon Target Application

| General Purpose Cutting Machines in Poor Condition | CARBON STEELS | STRUCTURAL STEELS | ALUMINUM & LT. ALLOY STEELS | ALLOY STEELS MOLD STEELS | TOOL STEELS | STAINLESS STEELS | NICKEL BASE ALLOYS | TITANIUM ALLOYS |
|---|---|---|---|---|---|---|---|---|
| AISI | 1010, 1020, 1045 | A36 | 6061, 2011 2024, 5052 | 4140, P20 | A2, H13, S7 M-Series | 316, 304 17-4 PH,, 15-5 PH | Inconel, Monel, Waspalloy | Ti-6Al-4V |
| JIS | S20C, S45C | | 6061, 2011, 2024, 5052 | SCM 440(H), SCM 445(H) | SHD11, SHD12, SKD61,SKS41 | SUS316, SUS304 | NCuP-O | H4650, H4600 |
| DIN | Ck45, C16.8 | | AlCuPb, AlCuMg2, AlMg2Mn0.3 | 41CrMo4 | X155CrVMoV51, (G)X40CrMoV51 | X5CrNiMo18 10, X5CrNi18 10 | NiCr19NbMo, NiCr19Co14Mo4Ti | |

MATRIX II

M42

THE MORSE ACHIEVER™

CHALLENGER

INDEPENDENCE II®

INDEPENDENCE EXS®

## MORSE CARBIDE TIPPED BAND SAW BLADE APPLICATIONS

Selection Based Upon Target Application

| | CARBON STEELS | ALUMINUM & LT. ALLOY STEELS | ALLOY STEELS MOLD STEELS | TOOL STEELS | STAINLESS STEELS | NICKEL BASE ALLOYS | TITANIUM ALLOYS | CASE HARDENED | ALUMINUM CASTINGS | ABRASIVE WOODS | COMPOSITES | GRAPHITE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AISI | 1010, 1020, 1045 | 6061, 2011 2024, 5052 | 4140, P20 | A2, H13, S7 M-Series | 316, 304 17-4 PH, 15-5 PH | Inconel, Monel, Waspalloy | Ti-6Al-4V | | | | | |
| JIS | S20C, S45C | 6061, 2011, 2024, 5052 | SCM 440(H), SCM 445(H) | SHD11, SHD12, SKD61,SKS41 | SUS316, SUS304 | NCuP-O | H4650, H4600 | | | | | |
| DIN | Ck45, C16.8 | AlCuPb, AlCuMg2, AlMg2Mn0.3 | 41CrMo4 | X155CrVMoV51, (G)X40CrMoV51 | X5CrNiMo18 10, X5CrNi18 10 | NiCr19NbMo, NiCr19Co14Mo4Ti | | | | | | |

M-FACTOR BY MORSE® – GP

M-FACTOR CH

M-FACTOR – FB

## MORSE CARBIDE GRIT BAND SAW BLADE APPLICATIONS

Selection Based Upon Target Application

| CAST IRON HARDENED STEEL | CERAMICS FOAMED GLASS | FIBERGLASS | CABLE WIRE ROPE | CEMENT CONCRETE | TIRES & WIRE REINFORCED RUBBER | GRAPHITE | COMPOSITES |
|---|---|---|---|---|---|---|---|

CARBIDE GRIT

## MORSE CARBON BAND SAW BLADE APPLICATION OVERVIEW

Selection Based Upon Target Application

| PRODUCTION WOOD CUTTING | WOOD CUTTING | CARBON STEELS | LOW ALLOY STEELS | NON-FERROUS METALS | NON-METALIC MATERIALS/PLASTIC |
|---|---|---|---|---|---|

HARD EDGE HARD BACK / HARD EDGE FLEX BACK

# TOOTH TYPES

| | | Advantages | Benefits |
|---|---|---|---|
| **Variable Pitch** | – Varying Gullet Depth<br>– 0° Rake Angle<br>– Variable Tooth Spacing | • Excellent chip carrying capacity<br>• Reduces Harmonic Vibration | • Improves blade life<br>• Reduces noise<br>• Cuts smoother and more efficiently |
| **Variable Pitch** Positive Rake | – Varying Gullet Depth<br>– Variable Tooth Spacing<br>– Positive Rake Angle | • Better chip formation<br>• Excellent chip carrying capacity<br>• Reduces Harmonic Vibration<br>• More aggressive cutting | • Cuts smoother<br>• Reduces noise<br>• Wide range of applications<br>• Easier chip generation |
| **Standard** Raker | – Equally Spaced Teeth<br>– 0° Rake Angle<br>– Positive Rake Angle | • Excellent chip carrying capacity | • General purpose |
| **SKIP** | – Wide Flat Gullets<br>– 0° Rake Angle<br>– Equally Spaced Teeth | • Excellent chip carrying capacity<br>• Provide coarse pitch on narrow bands | • Excellent cutting for non-metallic & non-ferrous applications (Wood, Brass, Copper, Bronze & Aluminum)<br>• Helps break "Stringy" chips |
| **Hook** | – Wide Rounded Gullets<br>– Positve Rake Angle<br>– Equally Spaced Teeth | • Excellent chip carrying in Non-Metallic Applications<br>• Positive Rake provides better tip penetration with less feed pressure | • Good cutting performance in discontinuous chip forming materials (Cast Iron)<br>• Positive Rake provides better tip penetration with less feed pressure |

## VISE LOADING

**Loading smaller bundles can mean greater sawing efficiency.**

All machines have a stated loading capacity – but the optimum level is usually lower. Cutting rates are often best at less than full vise capacity.

These diagrams represent the recommended way of loading and fixturing if conditions permit.


**Horizontal Sawing Applications**

**Vertical Sawing Applications**

**Safety** *Cutting tools can shatter and/or break under improper or severe use.*

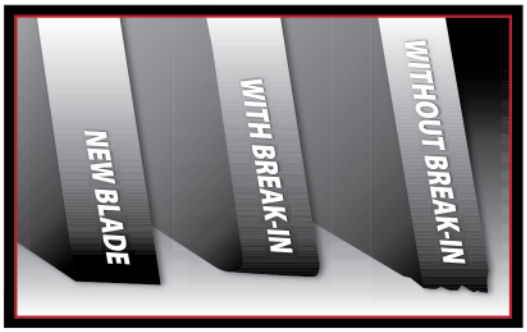
*Wear safety equipment, and particularly eye protection (goggles), gloves and hearing protection (ear plugs), at all times in the vicinity of their use.*

*Always follow band saw machine manufacturers' recommendations.*

# BLADE BREAK-IN and TROUBLESHOOTING

## Extremely Important!

The extremely sharp tooth points and edges of new blades must be broken-in before applying full feed pressure to the blade. A good analogy is that of writing with a freshly sharpened wooden pencil.




## Recommended Procedure

**(1)** Maintain proper blade speed for the material to be cut.

**(2)** Reduce blade feed pressure or feed rate by 50% for the first 50 to 100 square inches of material cut.

**(3)** Gradually increase feed pressure or feed rate after break-in to full pressure or rate.

## SQUARE INCH CONVERSION CHART

***Converting Material Diameter to Square Inches to calculate Break-In Time***

| Dia. | Sq. Inch | Dia. | Sq. Inch | Dia. | Sq. Inch | Dia. | Sq. Inch | Dia. | Sq. Inch | Dia. | Sq. Inch |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/8" | .11 | 3-3/8" | 8.95 | 6-5/8" | 34.47 | 9-5/8" | 72.76 | 13-1/4" | 137.81 | 19-1/4" | 290.88 |
| 1/2" | .20 | 3-1/2" | 9.62 | 6-3/4" | 35.80 | 9-3/4" | 74.50 | 13-1/2" | 143.06 | 19-1/2" | 298.49 |
| 9/16" | .25 | 3-5/8" | 10.32 | 6-7/8" | 37.12 | 9-7/8" | 76.59 | 13-3/4" | 148.41 | 19-3/4" | 306.19 |
| 5/8" | .31 | 3-7/8" | 11.04 | 7" | 38.48 | 10" | 78.53 | 14" | 153.86 | 20" | 314.00 |
| 3/4" | .44 | 4" | 12.56 | 7-1/8" | 39.87 | 10-1/8" | 80.52 | 14-1/4" | 159.40 | 20-1/4" | 321.89 |
| 7/8" | .60 | 4-1/8" | 13.36 | 7-1/4" | 41.30 | 10-1/4" | 82.50 | 14-1/2" | 165.04 | 20-1/2" | 330.09 |
| 1" | .79 | 4-3/8" | 15.03 | 7-3/8" | 42.72 | 10-3/8" | 84.54 | 14-3/4" | 170.78 | 20-3/4" | 337.98 |
| 1-1/8" | .99 | 4-1/2" | 15.90 | 7-1/2" | 44.17 | 10-1/2" | 86.60 | 15" | 176.62 | 21" | 346.18 |
| 1-1/4" | 1.22 | 4-5/8" | 16.80 | 7-5/8" | 45.66 | 10-5/8" | 88.66 | 15-1/4" | 182.55 | 21-1/4" | 354.47 |
| 1-3/8" | 1.49 | 4-3/4" | 17.72 | 7-3/4" | 47.20 | 10-3/4" | 91.00 | 15-1/2" | 188.59 | 21-1/2" | 362.86 |
| 1-1/2" | 1.76 | 4-7/8" | 18.67 | 7-7/8" | 48.71 | 10-7/8" | 92.89 | 15-3/4" | 194.72 | 21-3/4" | 371.35 |
| 1-5/8" | 2.07 | 5" | 19.63 | 8" | 50.26 | 11" | 95.00 | 16" | 200.96 | 22" | 379.94 |
| 1-3/4" | 2.40 | 5-1/8" | 20.63 | 8-1/8" | 51.85 | 11-1/8" | 97.21 | 16-1/4" | 207.28 | 22-1/4" | 388.62 |
| 1-7/8" | 2.76 | 5-1/4" | 21.64 | 8-1/4" | 53.50 | 11-1/4" | 99.50 | 16-1/2" | 213.71 | 22-1/2" | 397.40 |
| 2" | 3.14 | 5-3/8" | 22.69 | 8-3/8" | 55.09 | 11-3/8" | 101.62 | 16-3/4" | 220.23 | 22-3/4" | 406.28 |
| 2-1/8" | 3.55 | 5-1/2" | 23.75 | 8-1/2" | 56.74 | 11-1/2" | 104.00 | 17" | 226.86 | 23" | 415.26 |
| 2-1/4" | 3.97 | 5-5/8" | 24.85 | 8-5/8" | 58.43 | 11-5/8" | 106.14 | 17-1/4" | 233.58 | 23-1/4" | 424.35 |
| 2-3/8" | 4.43 | 5-3/4" | 25.96 | 8-3/4" | 60.00 | 11-3/4" | 108.40 | 17-1/2" | 240.40 | 23-1/2" | 433.51 |
| 2-1/2" | 4.90 | 5-7/8" | 27.11 | 8-7/8" | 61.86 | 11-7/8" | 110.75 | 17-3/4" | 247.32 | 23-3/4" | 442.78 |
| 2-5/8" | 5.41 | 6" | 28.27 | 9" | 63.61 | 12" | 113.00 | 18" | 254.36 | 24" | 452.16 |
| 2-7/8" | 6.49 | 6-1/8" | 29.47 | 9-1/8" | 65.40 | 12-1/4" | 117.78 | 18-1/4" | 261.45 | 24-1/4" | 461.62 |
| 3" | 7.06 | 6-1/4" | 30.70 | 9-1/4" | 67.20 | 12-1/2" | 122.75 | 18-1/2" | 268.66 | 24-1/2" | 471.19 |
| 3-1/8" | 7.67 | 6-3/8" | 31.92 | 9-3/8" | 69.03 | 12-3/4" | 127.70 | 18-3/4" | 275.97 | 24-3/4" | 480.85 |
| 3-1/4" | 8.25 | 6-1/2" | 33.18 | 9-1/2" | 71.00 | 13" | 132.00 | 19" | 283.43 | 25" | 490.88 |

### Area of a Circle

$A=(Pi\ R^2)$

| | |
|---|---|
| P ($\pi$) | =3.1416 |
| Radius ($R$) | =1/2 Dia. |
| $R^2$ | =R x R |

*Example:*
**Area of a 4-1/4" Round?**

**P=**
*.5 x 4.25 = 2.125*

**$R^2$=**
*2.125 x 2.125 = 4.516*

**A=**
*3.1416 x 4.516 =* ***14.18*** *sq. in.*

## TROUBLESHOOTING WITH CHIP FORMATION

You can improve the productivity of your metal cutting operation by paying close attention to the chips made by the blade cutting through metal.

This chart shows some of the common problems that can be discovered and solved by paying attention to chips.

| Chip Form |  |  |  |  |
|---|---|---|---|---|
| Chip Condition | Thick, Hard, and Short | Thin and Curled | Powder | Thin and Curl Tight |
| Chip Color | Blue or Brown | Silver | Silver | Silver |
| Blade Speed | Decrease | Suitable | Decrease | Suitable |
| Blade Feed | Decrease | Suitable | Increase | Decrease |
| Other | Check Cutting Fluid & Mix | | | Check Tooth Pitch |

## Cutting Fluids

*Cutting fluids enhance sawing efficiency and extend blade life by both cooling and lubricating.*

*A fluid mixture with too high a water to fluid ratio will not lubricate properly and may cause rapid tooth wear and could result in blade failure.*

*When adjusting fluid level, never add water only. Keep a properly mixed supply of replenishing fluid on hand.*

# CUT TIME CALCULATOR

The following chart will help you determine how long a cut will take by cross referencing the bar size to be cut with the removal rate being used.

| Bar Dia. | Bar Area, In² | Removal Rate - Square Inches Per Minute | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 in²/min | 2 in²/min | 3 in²/min | 4 in²/min | 5 in²/min | 6 in²/min | 7 in²/min | 8 in²/min | 9 in²/min | 10 in²/min | 11 in²/min | 12 in²/min | 13 in²/min | 14 in²/min | 15 in²/min | 16 in²/min | 17 in²/min | 18 in²/min |
| | | Minutes Per Cut | | | | | | | | | | | | | | | | | |
| 1.00 | 0.79 | .79 | .39 | .26 | .20 | .16 | .13 | .11 | .10 | .09 | .08 | .07 | .07 | .06 | .06 | .05 | .05 | .05 | .04 |
| 1.25 | 1.23 | 1.2 | .61 | .41 | .31 | .25 | .20 | .18 | .15 | .14 | .12 | .11 | .10 | .09 | .09 | .08 | .08 | .07 | .07 |
| 1.50 | 1.77 | 1.8 | .88 | .59 | .44 | .35 | .29 | .25 | .22 | .20 | .18 | .16 | .15 | .14 | .13 | .12 | .11 | .10 | .10 |
| 1.75 | 2.41 | 2.4 | 1.2 | .80 | .60 | .48 | .40 | .34 | .30 | .27 | .24 | .22 | .20 | .19 | .17 | .16 | .15 | .14 | .13 |
| 2.00 | 3.14 | 3.1 | 1.6 | 1.0 | .79 | .63 | .52 | .45 | .39 | .35 | .31 | .29 | .26 | .24 | .22 | .21 | .20 | .18 | .17 |
| 2.25 | 3.98 | 4.0 | 2.0 | 1.3 | 1.0 | .80 | .66 | .57 | .50 | .44 | .40 | .36 | .33 | .31 | .28 | .27 | .25 | .23 | .22 |
| 2.50 | 4.91 | 4.9 | 2.5 | 1.6 | 1.2 | 1.0 | .82 | .70 | .61 | .55 | .49 | .45 | .41 | .38 | .35 | .33 | .31 | .29 | .27 |
| 2.75 | 5.94 | 5.9 | 3.0 | 2.0 | 1.5 | 1.2 | 1.0 | .85 | .74 | .66 | .59 | .54 | .49 | .46 | .42 | .40 | .37 | .35 | .33 |
| 3.00 | 7.07 | 7.1 | 3.5 | 2.4 | 1.8 | 1.4 | 1.2 | 1.0 | .88 | .79 | .71 | .64 | .59 | .54 | .50 | .47 | .44 | .42 | .39 |
| 3.25 | 8.30 | 8.3 | 4.1 | 2.8 | 2.1 | 1.7 | 1.4 | 1.2 | 1.0 | .92 | .83 | .75 | .69 | .64 | .59 | .55 | .52 | .49 | .46 |
| 3.50 | 9.62 | 9.6 | 4.8 | 3.2 | 2.4 | 1.9 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | .87 | .80 | .74 | .69 | .64 | .60 | .57 | .53 |
| 3.75 | 11.04 | 11.0 | 5.5 | 3.7 | 2.8 | 2.2 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | .92 | .85 | .79 | .74 | .69 | .65 | .61 |
| 4.00 | 12.57 | 12.6 | 6.3 | 4.2 | 3.1 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 1.0 | .90 | .84 | .79 | .74 | .70 |
| 4.25 | 14.19 | 14.2 | 7.1 | 4.7 | 3.5 | 2.8 | 2.4 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | .95 | .89 | .83 | .79 |
| 4.50 | 15.90 | 15.9 | 8.0 | 5.3 | 4.0 | 3.2 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | .94 | .88 |
| 4.75 | 17.72 | 17.7 | 8.9 | 5.9 | 4.4 | 3.5 | 3.0 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 |
| 5.00 | 19.64 | 19.6 | 9.8 | 6.5 | 4.9 | 3.9 | 3.3 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 |
| 5.25 | 21.65 | 21.6 | 10.8 | 7.2 | 5.4 | 4.3 | 3.6 | 3.1 | 2.7 | 2.4 | 2.2 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.4 | 1.3 | 1.2 |
| 5.50 | 23.76 | 23.8 | 11.9 | 7.9 | 5.9 | 4.8 | 4.0 | 3.4 | 3.0 | 2.6 | 2.4 | 2.2 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| 5.75 | 25.97 | 26.0 | 13.0 | 8.7 | 6.5 | 5.2 | 4.3 | 3.7 | 3.2 | 2.9 | 2.6 | 2.4 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 |
| 6.00 | 28.27 | 28.3 | 14.1 | 9.4 | 7.1 | 5.7 | 4.7 | 4.0 | 3.5 | 3.1 | 2.8 | 2.6 | 2.4 | 2.2 | 2.0 | 1.9 | 1.8 | 1.7 | 1.6 |
| 6.25 | 30.68 | 30.7 | 15.3 | 10.2 | 7.7 | 6.1 | 5.1 | 4.4 | 3.8 | 3.4 | 3.1 | 2.8 | 2.6 | 2.4 | 2.2 | 2.0 | 1.9 | 1.8 | 1.7 |
| 6.50 | 33.18 | 33.2 | 16.6 | 11.1 | 8.3 | 6.6 | 5.5 | 4.7 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 2.0 | 1.8 |
| 6.75 | 35.78 | 35.8 | 17.9 | 11.9 | 8.9 | 7.2 | 6.0 | 5.1 | 4.5 | 4.0 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 2.0 |
| 7.00 | 38.48 | 38.5 | 19.2 | 12.8 | 9.6 | 7.7 | 6.4 | 5.5 | 4.8 | 4.3 | 3.8 | 3.5 | 3.2 | 3.0 | 2.7 | 2.6 | 2.4 | 2.3 | 2.1 |
| 7.25 | 41.28 | 41.3 | 20.6 | 13.8 | 10.3 | 8.3 | 6.9 | 5.9 | 5.2 | 4.6 | 4.1 | 3.8 | 3.4 | 3.2 | 2.9 | 2.8 | 2.6 | 2.4 | 2.3 |
| 7.50 | 44.18 | 44.2 | 22.1 | 14.7 | 11.0 | 8.8 | 7.4 | 6.3 | 5.5 | 4.9 | 4.4 | 4.0 | 3.7 | 3.4 | 3.2 | 2.9 | 2.8 | 2.6 | 2.5 |
| 7.75 | 47.17 | 47.2 | 23.6 | 15.7 | 11.8 | 9.4 | 7.9 | 6.7 | 5.9 | 5.2 | 4.7 | 4.3 | 3.9 | 3.6 | 3.4 | 3.1 | 2.9 | 2.8 | 2.6 |
| 8.00 | 50.27 | 50.3 | 25.1 | 16.8 | 12.6 | 10.1 | 8.4 | 7.2 | 6.3 | 5.6 | 5.0 | 4.6 | 4.2 | 3.9 | 3.6 | 3.4 | 3.1 | 3.0 | 2.8 |
| 8.25 | 53.46 | 53.5 | 26.7 | 17.8 | 13.4 | 10.7 | 8.9 | 7.6 | 6.7 | 5.9 | 5.3 | 4.9 | 4.5 | 4.1 | 3.8 | 3.6 | 3.3 | 3.1 | 3.0 |
| 8.50 | 56.75 | 56.7 | 28.4 | 18.9 | 14.2 | 11.3 | 9.5 | 8.1 | 7.1 | 6.3 | 5.7 | 5.2 | 4.7 | 4.4 | 4.1 | 3.8 | 3.5 | 3.3 | 3.2 |
| 8.75 | 60.13 | 60.1 | 30.1 | 20.0 | 15.0 | 12.0 | 10.0 | 8.6 | 7.5 | 6.7 | 6.0 | 5.5 | 5.0 | 4.6 | 4.3 | 4.0 | 3.8 | 3.5 | 3.3 |
| 9.00 | 63.62 | 63.6 | 31.8 | 21.2 | 15.9 | 12.7 | 10.6 | 9.1 | 8.0 | 7.1 | 6.4 | 5.8 | 5.3 | 4.9 | 4.5 | 4.2 | 4.0 | 3.7 | 3.5 |
| 9.25 | 67.20 | 67.2 | 33.6 | 22.4 | 16.8 | 13.4 | 11.2 | 9.6 | 8.4 | 7.5 | 6.7 | 6.1 | 5.6 | 5.2 | 4.8 | 4.5 | 4.2 | 4.0 | 3.7 |
| 9.50 | 70.88 | 70.9 | 35.4 | 23.6 | 17.7 | 14.2 | 11.8 | 10.1 | 8.9 | 7.9 | 7.1 | 6.4 | 5.9 | 5.5 | 5.1 | 4.7 | 4.4 | 4.2 | 3.9 |
| 9.75 | 74.66 | 74.7 | 37.3 | 24.9 | 18.7 | 14.9 | 12.4 | 10.7 | 9.3 | 8.3 | 7.5 | 6.8 | 6.2 | 5.7 | 5.3 | 5.0 | 4.7 | 4.4 | 4.1 |
| 10.00 | 78.54 | 78.5 | 39.3 | 26.2 | 19.6 | 15.7 | 13.1 | 11.2 | 9.8 | 8.7 | 7.9 | 7.1 | 6.5 | 6.0 | 5.6 | 5.2 | 4.9 | 4.6 | 4.4 |

# TECH INFORMATION

## CUTTING SPEED CHART

## BLADE SPEED/REMOVAL RATES

**For use with Bi-Metal Blades***

| TYPE OF MATERIAL | UNDER 1" | | 1" TO 3" | | 3" TO 6" | | 6" - OVER | |
|---|---|---|---|---|---|---|---|---|
| | Blade Speed (SFM) | Removal Rate ($in^2$/min.) | Blade Speed (SFM) | Removal Rate ($in^2$/min.) | Blade Speed (SFM) | Removal Rate ($in^2$/min.) | Blade Speed (SFM) | Removal Rate ($in^2$/min.) |
| **STRUCTURAL STEEL SHAPES** | | | | | | | | |
| A36, A242, A662 | 300 | | 280 | | 260 | | 240 | |
| **CARBON STEEL** | | | | | | | | |
| 1005 - 1013 | 310 | 8 - 12 | 290 | 10 - 15 | 270 | 13 - 18 | 250 | 11 - 16 |
| 1015 - 1035 | 300 | 9 - 13 | 280 | 13 - 17 | 260 | 15 - 20 | 250 | 11 - 17 |
| 1040 - 1059 | 240 | 5 - 7 | 230 | 6 - 8 | 205 | 8 - 11 | 190 | 7 - 10 |
| 1060 - 1080 | 220 | 4 - 7 | 205 | 7 - 8 | 195 | 8 - 11 | 160 | 7 - 9 |
| 1084 - 1095 | 200 | 3 - 6 | 190 | 5 - 7 | 180 | 6 - 8 | 130 | 5 - 8 |
| **FREE MACHINING STEEL** | | | | | | | | |
| 1110 | 310 | 9 - 12 | 280 | 11 - 15 | 280 | 15 - 18 | 240 | 12 - 15 |
| 1117 - 1118 | 300 | 9 - 13 | 270 | 11 - 16 | 270 | 14 - 19 | 230 | 12 - 17 |
| 1137 - 1151 | 260 | 6 - 8 | 230 | 7 - 10 | 220 | 10 - 13 | 190 | 8 - 12 |
| 1211 - 1215 | 310 | 9 - 12 | 290 | 11 - 15 | 270 | 14 - 19 | 250 | 13 - 17 |
| **MANGANESE STEEL** | | | | | | | | |
| 1330 - 1345 | 260 | 4 - 7 | 240 | 6 - 8 | 215 | 8 - 11 | 195 | 6 - 9 |
| 1513 - 1536 | 300 | 11 - 13 | 280 | 14 - 15 | 260 | 16 - 18 | 240 | 12 - 17 |
| 1541 - 1572 | 245 | 4 - 7 | 230 | 6 - 8 | 200 | 9 - 11 | 175 | 8 - 10 |
| **MOLYBDENUM STEEL** | | | | | | | | |
| 4012 - 4024 | 250 | 4 - 7 | 230 | 6 - 8 | 200 | 8 - 11 | 175 | 6 - 10 |
| 4027 - 4037 | 240 | 4 - 7 | 230 | 6 - 9 | 190 | 8 - 11 | 170 | 6 - 10 |
| 4042 - 4047 | 220 | 4- 6 | 210 | 5 - 7 | 170 | 6- 9 | 150 | 5 - 8 |
| **CHROME MOLY STEEL** | | | | | | | | |
| 4118 - 4130 | 230 | 5 - 9 | 220 | 7 - 11 | 200 | 9 - 13 | 180 | 8 - 12 |
| 4135 - 4142 | 220 | 4 - 7 | 210 | 6 - 9 | 190 | 9 - 13 | 170 | 8 - 12 |
| 4145 - 4161 | 200 | 2 - 6 | 180 | 5 - 8 | 180 | 6 - 10 | 160 | 5 - 8 |
| **NICKEL CHROME MOLY STEEL** | | | | | | | | |
| 4317 - 4320 | 210 | 4 - 6 | 190 | 5 - 8 | 170 | 6 - 9 | 150 | 5 - 8 |
| 4337 - 4340 | 200 | 4 - 6 | 180 | 4 - 7 | 160 | 5 - 8 | 140 | 4 - 7 |
| 4718 - 4720 | 275 | 4 - 7 | 270 | 6 - 8 | 245 | 7 - 10 | 220 | 5 - 8 |
| 8615 - 8627 | 210 | 4 - 6 | 190 | 5 - 7 | 170 | 6 - 8 | 150 | 4 - 7 |
| 8630 - 8645 | 210 | 3 - 5 | 190 | 4 - 6 | 170 | 5 - 7 | 150 | 4 - 6 |
| 8647 - 8660 | 210 | 2 - 4 | 190 | 3- 5 | 170 | 4 - 6 | 150 | 3 - 5 |
| 8715 - 8750 | 210 | 3 - 6 | 190 | 5 - 8 | 170 | 6 - 8 | 150 | 4 - 7 |
| 9310 - 9317 | 190 | 2- 4 | 160 | 3 - 5 | 150 | 3 - 5 | 130 | 2 - 4 |
| 9437 - 9445 | 210 | 4 - 6 | 190 | 5 - 7 | 170 | 5 - 8 | 150 | 4 - 7 |
| 9747 - 9763 | 210 | 3 - 5 | 190 | 4 - 6 | 170 | 4 - 7 | 150 | 3 - 6 |
| 9840 - 9850 | 210 | 4 - 7 | 190 | 5 - 8 | 170 | 6 - 9 | 150 | 4 - 8 |
| **NICKEL MOLY STEEL** | | | | | | | | |
| 4615 - 4626 | 220 | 4 - 7 | 200 | 5 - 8 | 180 | 6 - 9 | 160 | 5 - 8 |
| 4815 - 4820 | 210 | 3 - 6 | 190 | 3 - 6 | 170 | 4 - 6 | 140 | 4 - 6 |
| **CHROMIUM STEEL** | | | | | | | | |
| 5045 - 5046 | 210 | 5 -8 | 190 | 6 - 9 | 170 | 8 - 11 | 150 | 7 - 10 |
| 5120 - 5135 | 230 | 4 - 6 | 210 | 6 - 8 | 180 | 7 - 10 | 160 | 5 - 9 |
| 5140 - 5160 | 210 | 4 - 6 | 190 | 4 - 6 | 170 | 5 - 7 | 150 | 4 - 6 |
| 50100 - 52100 | 175 | 3 - 5 | 140 | 4 - 6 | 130 | 5 - 7 | 110 | 4 - 6 |
| **CHROME VANADIUM STEEL** | | | | | | | | |
| 6118 | 230 | 4 - 6 | 210 | 5 - 8 | 190 | 6 - 9 | 170 | 5 - 8 |
| 6150 | 210 | 3 - 5 | 190 | 4 - 7 | 170 | 5 - 8 | 150 | 4 - 7 |
| **SILICON STEEL** | | | | | | | | |
| 9254 - 9260 | 210 | 3 - 5 | 190 | 4 - 6 | 190 | 4 - 8 | 160 | 3 - 7 |
| **COLD WORK DIE STEEL** | | | | | | | | |
| A2, A3, A6 | 210 | 2 - 4 | 190 | 3 - 5 | 190 | 3 - 6 | 160 | 2 - 4 |
| A7 | 170 | 2 - 4 | 160 | 4 - 5 | 150 | 3 - 6 | 125 | 2 - 4 |
| D2, D3, D4 | 135 | 1 - 3 | 115 | 2 - 4 | 120 | 2 - 4 | 80 | 2 - 3 |
| D7 | 110 | 1 - 3 | 90 | 1 - 3 | 80 | 2 - 3 | 60 | 1 - 3 |
| O1, O2 | 240 | 3 - 6 | 230 | 4 - 7 | 200 | 5 - 8 | 180 | 4 - 7 |
| O6, O7 | 230 | 4 - 7 | 220 | 5 - 8 | 200 | 6 - 9 | 160 | 5 - 8 |
| **HOT WORK STEEL** | | | | | | | | |
| H12, H13, H21 | 235 | 3 - 6 | 200 | 4 - 6 | 190 | 4 - 7 | 170 | 3 - 6 |
| H22, H24, H25 | 190 | 2 - 4 | 175 | 2 - 5 | 160 | 3 - 6 | 135 | 2 - 4 |
| **SHOCK RESISTANT STEEL** | | | | | | | | |
| S1 | 230 | 3 - 6 | 210 | 4 - 6 | 200 | 4 - 7 | 160 | 3 - 6 |
| S2, S5 | 180 | 2 - 4 | 165 | 3 - 5 | 150 | 3 - 6 | 120 | 2 - 4 |

# BLADE SPEED/REMOVAL RATES

## For use with Bi-Metal Blades*

| TYPE OF MATERIAL | UNDER 1" | | 1" TO 3" | | 3" TO 6" | | 6" - OVER | |
|---|---|---|---|---|---|---|---|---|
| | Blade Speed (SFM) | Removal Rate ($in^2$/min.) | Blade Speed (SFM) | Removal Rate ($in^2$/min.) | Blade Speed (SFM) | Removal Rate ($in^2$/min.) | Blade Speed (SFM) | Removal Rate ($in^2$/min.) |
| **SPECIAL PURPOSE STEEL** | | | | | | | | |
| L2, L6 | 210 | 3 - 5 | 210 | 4 - 7 | 190 | 5 - 8 | 175 | 4 - 7 |
| L7 | 200 | 3 - 5 | 190 | 4 - 6 | 180 | 4 - 7 | 130 | 3 - 6 |
| **WATER HARDENING STEEL** | | | | | | | | |
| W1 | 265 | 3 - 6 | 240 | 5 - 7 | 220 | 5 - 7 | 180 | 3 - 5 |
| **HIGH SPEED STEEL** | | | | | | | | |
| M1, M2, M7 | 165 | 2 - 4 | 150 | 2 - 5 | 145 | 3 - 6 | 100 | 3 - 5 |
| M3, M4, M10 | 125 | 2 - 4 | 100 | 2 - 5 | 100 | 3 - 5 | 80 | 3 - 4 |
| M30, M33 | 100 | 1 - 3 | 90 | 2 - 3 | 75 | 2 - 3 | 70 | 1 - 3 |
| M41, M42, M43 | 100 | 1 - 3 | 90 | 1 - 3 | 75 | 1 - 4 | 70 | 1 - 3 |
| T1, T2 | 150 | 2 - 4 | 135 | 2 - 4 | 120 | 2 - 5 | 100 | 2 - 4 |
| T4, T5, T6 | 125 | 1 - 3 | 110 | 1 - 4 | 100 | 2 - 4 | 85 | 1 - 3 |
| T15, M15 | 90 | 1 - 3 | 70 | 1 - 3 | 60 | 1 - 3 | 50 | 1 - 2 |
| **AUSTENITIC STAINLESS STEEL** | | | | | | | | |
| 201, 202, 301 - 304 | 135 | 3 - 4 | 120 | 2 - 5 | 120 | 3 - 6 | 85 | 2 - 4 |
| 303, 303F, 303Se | 160 | 3 - 6 | 140 | 3 - 6 | 135 | 4 - 6 | 90 | 3 - 5 |
| 305, 308 - 314 | 100 | 1 - 2 | 85 | 1 - 2 | 75 | 1 - 3 | 65 | 1 - 2 |
| 316, 317, 329 | 100 | 1 - 2 | 90 | 1 - 2 | 80 | 1 - 3 | 60 | 1 - 2 |
| 321, 347, 348 | 140 | 2 - 4 | 125 | 2 - 5 | 120 | 3 - 6 | 90 | 2 - 4 |
| 330 | 85 | 1 - 2 | 65 | 1 - 3 | 55 | 1 - 4 | 45 | 1 - 2 |
| **FERRITIC STAINLESS STEEL** | | | | | | | | |
| 429, 430 | 120 | 2 - 4 | 100 | 3 - 4 | 90 | 3 - 6 | 75 | 2 - 4 |
| 430F, 430FSe | 130 | 3 - 5 | 115 | 5 - 6 | 100 | 5 - 7 | 90 | 4 - 6 |
| 434, 436 | 100 | 2 - 4 | 80 | 3 - 4 | 75 | 3 - 5 | 55 | 3 - 4 |
| 442 | 110 | 2 - 4 | 85 | 3 - 5 | 75 | 3 - 6 | 60 | 3 - 5 |
| 446 | 90 | 2 - 4 | 70 | 3 - 4 | 60 | 2 - 5 | 50 | 1 - 3 |
| **MARTENSITIC STAINLESS** | | | | | | | | |
| 403, 410, 420 | 170 | 2 - 5 | 155 | 3 - 6 | 145 | 3 - 7 | 100 | 2 - 4 |
| 414, 416Se | 235 | 5 - 9 | 210 | 6 - 9 | 195 | 7 - 11 | 170 | 5 - 9 |
| 420F, 416 | 220 | 3 - 8 | 200 | 5 - 9 | 190 | 6 - 10 | 150 | 4 - 8 |
| 440A, B, C | 130 | 2 - 4 | 120 | 2 - 6 | 110 | 3 - 7 | 70 | 1 - 4 |
| 501, 502 | 135 | 1 - 2 | 120 | 2 - 4 | 100 | 3 - 4 | 80 | 2 - 3 |
| **NICKEL BASED ALLOYS** | | | | | | | | |
| Monel | 100 | 1 - 4 | 90 | 1 - 4 | 85 | 2 - 4 | 65 | 1 - 3 |
| K-Monel | 115 | 1 - 4 | 90 | 1 - 4 | 70 | 2 - 4 | 50 | 1 - 2 |
| R-Monel | 130 | 2 - 4 | 100 | 2 - 5 | 90 | 3 - 5 | 60 | 1 - 4 |
| K-R Monel | 115 | 1 - 4 | 100 | 1 - 4 | 100 | 2 - 5 | 65 | 1 - 3 |
| Inconel | 105 | 2- 4 | 90 | 2 - 4 | 75 | 2 - 3 | 50 | 1 - 2 |
| Inconel 625-x-750 | 95 | 1 - 2 | 80 | 1 - 2 | 70 | 1 - 2 | 40 | 1 |
| Inconel 718 | 95 | 1 - 2 | 80 | 1 - 2 | 70 | 1 - 2 | 40 | 1 |
| Incoloy 800 - 802 | 95 | 1 - 2 | 75 | 1 - 2 | 60 | 1 - 2 | 35 | 1 |
| Incoloy 804 - 825 | 60 | 1 | 40 | 1 - 2 | 40 | 1 - 2 | 30 | 1 |
| Waspalloy | 100 | 1 | 90 | 1 - 2 | 70 | 1 - 2 | 50 | 1 |
| Hastelloy A | 130 | 2 - 3 | 110 | 3 - 4 | 100 | 4 - 6 | 70 | 1 - 3 |
| Hastelloy B | 110 | 1 - 2 | 80 | 1 - 3 | 75 | 1 - 4 | 60 | 1 - 2 |
| Hastelloy C | 100 | 1 - 2 | 90 | 1 - 2 | 80 | 1 - 2 | 65 | 1 |
| Rene 41 | 90 | 1 | 80 | 1 - 2 | 60 | 1 - 2 | 50 | 1 |
| Udimet 500 | 95 | 1 | 80 | 1 - 2 | 70 | 1 - 2 | 60 | 1 |
| **TITANIUM** | | | | | | | | |
| 6AL 4V | 65 | .5-1 | 50 | 1 - 2 | 50 | 1 - 2 | 40 | .5 - 1 |
| **MARAGING STEEL** | | | | | | | | |
| Most | 190 | 3 - 4 | 145 | 4 - 6 | 110 | 6 - 7 | 90 | 4 - 6 |
| **BRONZE** | | | | | | | | |
| Most | 230 | 6 - 9 | 205 | 10 - 12 | 180 | 10 - 12 | 140 | 7 - 9 |
| Aluminum Bronze | 100 | 2 - 4 | 95 | 3 - 4 | 85 | 3 - 5 | 70 | 3 - 4 |
| **ALUMINUM** | | | | | | | | |
| Most | 800 | | 700 | | 600 | | 500 | |
| **CAST IRON** | | | | | | | | |
| Class 20 | 210 | 9 - 12 | 200 | 11 - 15 | 180 | 11 - 15 | 160 | 10 - 14 |
| Class 40 | 170 | 7 - 9 | 160 | 7 -10 | 140 | 8 - 12 | 120 | 7 - 11 |
| Ductile 60-40-18, 150 HB | 240 | 6 - 8 | 230 | 8 - 10 | 230 | 8 - 10 | 220 | 6 - 7 |
| Ductile 80-55-06, 225 HB | 140 | 3 - 4 | 130 | 4 - 5 | 120 | 5 - 7 | 110 | 3 - 5 |

***Reduce speeds by 50% for carbon blades. For carbide tipped blades, ask your Morse sales contact.**

# CONTACT US

## Technical Support

**Application Information & Problem Solving**
**1-800-733-3377 (US)**
**330-453-8187 (Int'l)**

**Bandsaw Blade Support**
*Product performance, problem solving by phone or in the field. Factory employed field technicians.*
**1-888-4BANDMAN (422-6362)**

**P.O. Box 8677**
**Canton, Ohio 44711 USA**

**FAX: 330-453-1111 • 800-729-1112**
**Email: mkmorse@mkmorse.com**

*Contact Your Morse Representative*

*Contact Your Local Distributor*

# TOTAL CONFIDENCE GUARANTEES

### Service
Morse is confident in our ability to offer you superior service.

### Quality
Morse is confident that our products will meet or exceed the quality demands of your toughest customers.

### Trial Blades
Morse is confident in the ability of our blades to meet the endusers expectations for performance.

## WE PROMISE

### Prompt
on time delivery when you need it most.

### Pricing
that is responsible everyday.

### Dependable
field sales and technical support.

### American Made
blades with the latest technology.

MORSE®
THE M. K. MORSE COMPANY