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(V Grooving Program - Thermwood Corporation P/L)
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(Version 1.0.1004  4/3/2008)


M98PSTRTTIME.SUBL1
G71 (metric)
G90 (Sets Machine Mode G90 - absolute, G91 - Incremental)
M48 (Allows feed rate overide on rapids)

[CLS]
[PRINT "   Do you want to run the Q&A Wizard,"]
[PRINT "OR Would you prefer to enter all the data together?"]
[PRINT "-----------------------------------------------------"]
[PRINT "       1=Run the Q&A Wizard"]
[PRINT "       2=Just fill in the data"]
[PRINT "       0=Neither, Exit the Program"]
[PRINT "-----------------------------------------------------"]
[PRINT "-----Type EXIT if you do not wish to continue.-----"]
[WINDOW ON]
[INPUT WIZARD]
[WINDOW OFF]
IF [STR$(WIZARD)="EXIT"] THEN M81L999
IF [WIZARD=0] THEN M81L999
IF [WIZARD<0] THEN M81L00
IF [WIZARD=1] THEN M81L01



M00

(USER DEFINED SETTINGS)
SET PROCESS_TYPE=2
SET DIRECTION=1
SET REP_QTY=1
SET UWASTE=15
SET MATERIAL_DZ=12
SET SHEET_LENGTH=2400
SET SHEET_WIDTH=1200
SET PIECE_LENGTH=800
SET PIECE_WIDTH=1200
SET SPACING=12
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SET EQUAL=2
SET FIXFIRST=9.75
SET MINFIRST=9.75
SET MINLAST=9.75
SET DADOTOOLNO=6
SET OUTTOOLNO=6


M80L01
(MACHINING SPECIFICATIONS)
SET Z_START=100.0000  (Set the Retract Height)
SET PRERAMP=6.0000  (Set the PreRamp Plunge Depth)
SET SKIN=1.0000  (Set the Onion Skin Thickness)
SET THROUGH=0.10000  (Set the Cut Through Depth)
SET RAMP=35.0000  (Set the PreRamp Length)
Set LLPERCENT = 0.85 (Sets the Last Line Feed Rate percentage)



SET DADOTOOLRPM=17500.0000 (Dado Tool - Spindle Speed)
SET DADOTOOLFSPEED=18000.0000 (Dado Tool - Feed Rate)
SET DADOTOOLPSPEED=8000.000 (Dado Tool - Plunge Rate)
SET DADOTOOLDEPTH=-1.500 (Dado Tool - Depth from Material Face)

SET OUTTOOLRPM=16500.0000 (Outline Tool - Spindle Speed)
SET OUTTOOLFSPEED=16000.0000 (Outline Tool - Feed Rate)
SET OUTTOOLPSPEED=8000.000 (Outline Tool - Plunge Rate)
[OUTTOOLDEPTH=(MATERIAL_DZ+THROUGH)]




IF [WIZARD=2] THEN M81L29  (Bypass the Wizard Questions)

M80L02
[CLS]
[PRINT "   Do you want to trim around the perimeter of the sheet,"]
[PRINT "OR Do you want to cut the panel to a certain o/ll size?"]
[PRINT "-----------------------------------------------------"]
[PRINT "       1=No, Just cut the grooves"]
[PRINT "       2=Yes, Cut the part to size and cut the Grooves"]
[PRINT "       0=Neither, Exit the Program"]
```

```
[PRINT "-----------------------------------------------------"]
[PRINT "-----Type EXIT if you do not wish to continue.-----"]
[WINDOW ON]
[INPUT PROCESS_TYPE]
[WINDOW OFF]
IF [STR$(PROCESS_TYPE)="EXIT"] THEN M81L999
IF [PROCESS_TYPE=0] THEN M81L999
IF [PROCESS_TYPE<0] THEN M81L02
IF [PROCESS_TYPE>2] THEN M81L02


M80L03
[CLS]
[PRINT "   Do you want the grooves to run the length of the sheet,"]
[PRINT " OR Do you want the grooves to run the width of the sheet?"]
[PRINT "-----------------------------------------------------"]
[PRINT "       1=Along the Length of the sheet (X Axis)"]
[PRINT "       2=Across the sheet (Y Axis)"]
[PRINT "       0=Neither, Exit the Program"]
[PRINT "-----------------------------------------------------"]
[PRINT "-----Type EXIT if you do not wish to continue.-----"]
[WINDOW ON]
[INPUT DIRECTION]
[WINDOW OFF]
IF [STR$(DIRECTION)="EXIT"] THEN M81L999
IF [DIRECTION=0] THEN M81L999
IF [DIRECTION<0] THEN M81L03
IF [DIRECTION>2] THEN M81L03


M80L04
[CLS]
[PRINT "   Do you want to Cut Multiple Quantity of identical sheets"]
[PRINT "-----------------------------------------------------"]
[PRINT "       ENTER YOUR REQUIRED QTY "]
[PRINT "-----------------------------------------------------"]
[PRINT "-----Type EXIT if you do not wish to continue.-----"]
[WINDOW ON]
[INPUT REP_QTY]
[WINDOW OFF]
IF [STR$(REP_QTY)="EXIT"] THEN M81L999
IF [REP_QTY=0] THEN M81L999
IF [REP_QTY<0] THEN M81L04
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M80L05
[CLS]
[PRINT " Enter the Exact Thickness of the Handling Sheet."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT UWASTE]
[WINDOW OFF]
IF [UWASTE<0] THEN M81L05
IF [UWASTE$="EXIT"] THEN M81L999



M80L06
[CLS]
[PRINT "  Enter the Exact Thickness of the Panel."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT MATERIAL_DZ]
[WINDOW OFF]
IF [STR$(MATERIAL_DZ)="EXIT"] THEN M81L999
IF [MATERIAL_DZ=0] THEN M81L06
IF [MATERIAL_DZ<0] THEN M81L06

IF [PROCESS_TYPE=2] THEN M81L09



M80L07
[CLS]
[PRINT "   Enter the Length of the Sheet (X Axis)."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT SHEET_LENGTH]
[WINDOW OFF]
IF [SHEET_LENGTH$="EXIT"] THEN M81L999



M80L08
[CLS]
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```
[PRINT "   Enter the Width of the Sheet (Y Axis)."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT SHEET_WIDTH]
[WINDOW OFF]
IF [SHEET_WIDTH$="EXIT"] THEN M81L999


IF [PROCESS_TYPE=1] THEN [PIECE_LENGTH=SHEET_LENGTH]
IF [PROCESS_TYPE=1] THEN [PIECE_WIDTH=SHEET_WIDTH]
IF [PROCESS_TYPE=1] THEN M81L11


M80L09
[CLS]
[PRINT "   Enter the Length of the Finished Piece (X Axis)."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT PIECE_LENGTH]
[WINDOW OFF]
IF [PIECE_LENGTH$="EXIT"] THEN M81L999


M80L10
[CLS]
[PRINT "   Enter the Width of the Finished Piece (Y Axis)."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT PIECE_WIDTH]
[WINDOW OFF]
IF [PIECE_WIDTH$="EXIT"] THEN M81L999


M80L11
[CLS]
[PRINT "   Enter the groove Spacing."]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT SPACING]
```

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[WINDOW OFF]
IF [SPACING$="EXIT"] THEN M81L999


M80L12
[CLS]
[PRINT "   Do you want to specify an exact Distance to the first Slat."]
[PRINT " OR Do you want to equalise the first and last Slat."]
[PRINT "-----------------------------------------------------"]
[PRINT "       1=Yes, Specify an exact distance to the first groove"]
[PRINT "       2=No, Just Equalise the Grooves"]
[PRINT "       0=Neither, Exit the Program"]
[PRINT "-----------------------------------------------------"]
[WINDOW ON]
[INPUT EQUAL]
[WINDOW OFF]
IF [EQUAL$="EXIT"] THEN M81L999
IF [EQUAL=2] THEN M81L14



M80L13
[CLS]
[PRINT "   Fixed Distance to Centre of First groove."]
[PRINT "-----------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT FIXFIRST]
[WINDOW OFF]
IF [FIXFIRST$="EXIT"] THEN M81L999


M80L14
[CLS]
[PRINT "   Enter the Minimum Distance to the First groove."]
[PRINT "        from start of board to first groove.      "]
[PRINT "-----------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT MINFIRST]
[WINDOW OFF]
IF [MINFIRST$="EXIT"] THEN M81L999
```

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M80L15
[CLS]
[PRINT "   Enter the Minimum Distance to the Last groove."]
[PRINT "          from last groove to end of board.       "]
[PRINT "-------------------------------------------------------"]
[PRINT "-------Type EXIT if you do not wish to continue.-------"]
[WINDOW ON]
[INPUT MINLAST]
[WINDOW OFF]
IF [MINLAST$="EXIT"] THEN M81L999


M80L17
[CLS]
[PRINT "               Enter the Dado Tool Number.             "]
[PRINT "-------------------------------------------------------------"]
[PRINT "      Enter 0 if you do not wish to pre-dado the grooves.     "]
[PRINT "-------------------------------------------------------------"]
[PRINT "----------Type EXIT if you do not wish to continue.-----------"]
[WINDOW ON]
[INPUT DADOTOOLNO]
[WINDOW OFF]
IF [DADOTOOLNO<0] THEN M81L17
IF [DADOTOOLNO$="EXIT"] THEN M81L999



IF [PROCESS_TYPE=1] THEN M81L30

M80L18
[CLS]
[PRINT "        Enter the Outline Tool Number."]
[PRINT "-------------------------------------------------------------"]
[PRINT "----------Type EXIT if you do not wish to continue.-----------"]
[WINDOW ON]
[INPUT OUTTOOLNO]
[WINDOW OFF]
IF [OUTTOOLNO=0] THEN M81L18
IF [OUTTOOLNO<0] THEN M81L18
IF [OUTTOOLNO$="EXIT"] THEN M81L999


M80L29
```

[REP_COUNT=REP_QTY]

(----------)
(----------)
(----------)
(----------)
(----------)

M80L30

[CLS]
[PRINT " Ensure that the wasteboard Handling Sheet is in position."]
[PRINT " "]
[PRINT "Position the sheet material into the G901 Part locator."]
[PRINT " "]
[WINDOW ON]
M00

IF [PROCESS_TYPE=1] THEN M81L50 (Grooves Only)
IF [PROCESS_TYPE=2] THEN M81L40 (Panel and Grooves)

(_____)
(_____ CUT PIECE TO SIZE_____)
(_____)

M80L40
SET ZSHIFT=MATERIAL_DZ+UWASTE
SET XSHIFT=0.000
SET YSHIFT=0.000

G901

S[OUTTOOLRPM] (Spindle Speed)
T[OUTTOOLNO] M3
M31 (verifies tool is up to programed speed before continuing)

```
(Panel Sizing Cutting Routine)
(-------------------------------------------------------)
(-------------------------------------------------------)

G90 G00 X[0-100]Y[0-READTOOLRAD]
   G00 Z[Z_START]



IF [SKIN=0] THEN M81L42

M80L41
G42 (Right Tool Compensation on)
G90 G01 Z[0-PRERAMP]F[OUTTOOLPSPEED]  (plunge)
   G01 X[0-(100+RAMP)]Z[0-(MATERIAL_DZ-SKIN)]F[OUTTOOLFSPEED]
   G01 X[0-(PIECE_LENGTH+READTOOLRAD)]
   G01 Y[0-(PIECE_WIDTH+READTOOLRAD)]
   G01 X[0-READTOOLRAD]
   G01 Y[0-READTOOLRAD]
   G01 X[0-(100+RAMP)]

  G90 G01 Z[0-(MATERIAL_DZ+THROUGH)]F[OUTTOOLPSPEED]  (plunge)
     G01 X[0-(PIECE_LENGTH+READTOOLRAD)]F[OUTTOOLFSPEED]
     G01 Y[0-(PIECE_WIDTH+READTOOLRAD)]
     G01 X[0-READTOOLRAD]
     G01 Y[0-READTOOLRAD]
     G01 X[0-(100+RAMP)]
     G00 Z[Z_START]
G40

M81L43

M80L42

G42 (Right Tool Compensation on)
G90 G01 Z[0-PRERAMP]F[OUTTOOLPSPEED]  (plunge)
   G01 X[0-(100+RAMP)]Z[0-(MATERIAL_DZ+THROUGH)]F[OUTTOOLFSPEED]
   G01 X[0-(PIECE_LENGTH+READTOOLRAD)]
   G01 Y[0-(PIECE_WIDTH+READTOOLRAD)]
   G01 X[0-READTOOLRAD]
   G01 Y[0-READTOOLRAD]
   G01 X[0-(100+RAMP)]
```

```
   G00 Z[Z_START]
G40

M80L43


(-------------------------------------------------------)
(-------------------------------------------------------)

G990
G90G00Z0
M05
G00X0Y0



[CLS]
[PRINT " Now that the Piece is cut to Size, Move away any offcuts."]
[PRINT " that will interfere with the following slatwall operations."]
[PRINT "   "]
[PRINT "Reposition the cut part into the G901 Locator."]
[PRINT "**********NOTE 901 PART LOCATOR NOT G902 Locator*********."]
[PRINT "**********NOTE 901 PART LOCATOR NOT G902 Locator*********."]
[PRINT "**********NOTE 901 PART LOCATOR NOT G902 Locator*********."]
[PRINT "**********NOTE 901 PART LOCATOR NOT G902 Locator*********."]
[PRINT "**********NOTE 901 PART LOCATOR NOT G902 Locator*********."]
[PRINT "**********NOTE 901 PART LOCATOR NOT G902 Locator*********."]
[PRINT "   "]
[WINDOW ON]
M00



(_____)
(_____ CUT GROOVES _____)
(_____)

M80L50
SET ZSHIFT=MATERIAL_DZ+UWASTE
SET XSHIFT=0.000
SET YSHIFT=0.000
G901
```

```
IF [DADOTOOLNO=0] THEN M81L70 (No Pre Dadoing Required)



S[DADOTOOLRPM] (Spindle Speed)
T[DADOTOOLNO] M3
M31 (verifies tool is up to programed speed before continuing)


IF [DIRECTION=1] THEN M81L60

M80L51
(START - Slatwall Y Axis Directional Dado Cutting Routine)
(-------------------------------------------------------)
(-------------------------------------------------------)

(Auto Calc)

IF [EQUAL=1] THEN  M81L52  (Specific 1st Groove Position)
IF [EQUAL=2] THEN  M81L53  (Equalised Grooves)



M80L52
[GROOVEQTY=(FIX((PIECE_LENGTH-(FIXFIRST+MINLAST))/SPACING)+1)]
[FIRSTPOS=FIXFIRST]
M81L54

M80L53
[GROOVEQTY=(FIX((PIECE_LENGTH-(MINFIRST+MINLAST))/SPACING)+1)]
[FIRSTPOS=((PIECE_LENGTH-(SPACING*(GROOVEQTY-1)))/2)]



M80L54

[CLS]
[PRINT "V Groove SPECIFICATION:"]
[PRINT "----------------------"]
[Print "The Sheet you are about to Cut is: " + STR$(SHEET_LENGTH) + " mm Long"]
[Print "The Sheet you are about to Cut is: " + STR$(SHEET_WIDTH) + " mm Wide"]
```

```
[Print "The Piece you are about to Cut is: " + STR$(PIECE_LENGTH) + " mm Long"]
[Print "The piece you are about to Cut is: " + STR$(PIECE_WIDTH) + " mm Wide"]
[Print "QTY of Grooves is: " + STR$(GROOVEQTY)]
[Print "The Calculated First Groove Position is: " + STR$(FIRSTPOS) + " mm"]

[Print "User Defined Min First Groove is: " + STR$(MINFIRST) + " mm"]
[Print "User Defined Min Last Groove is: " + STR$(MINLAST) + " mm"]
[Print "User Defined Fixed First Groove is: " + STR$(FIXFIRST) + " mm"]


[WINDOW ON]
M00 (program pause - does not stop spindle)
[WINDOW OFF]


[COUNTER=GROOVEQTY]


G90 G00 X[0-FIRSTPOS]Y[READTOOLRAD+5] (Position for first groove)
   G00 Z[Z_START]
   G01 Z[DADOTOOLDEPTH] F[DADOTOOLPSPEED]


M80L55


G91    G01 Y[0-(PIECE_WIDTH+(2*READTOOLRAD)+10)] F[DADOTOOLFSPEED]

[COUNTER=COUNTER-1]

IF [COUNTER=0] THEN M81L70



G91 G00 X[0-SPACING]
   G01 Y[(PIECE_WIDTH+(2*READTOOLRAD)+10)] F[DADOTOOLFSPEED]

[COUNTER=COUNTER-1]


IF [COUNTER=0] THEN M81L70

IF [COUNTER>0] THEN M81L56
```

```
M80L56
G91 G00 X[0-SPACING]
M81L55


(END - V Groove X Axis Directional Dado Cutting Routine)
(------------------------------------------------------------)
(------------------------------------------------------------)



M80L60  (Begin Grooves in X Direction)

M80L61
(START - V Groove X Axis Directional Dado Cutting Routine)
(------------------------------------------------------------)
(------------------------------------------------------------)

(Auto Calc)

IF [EQUAL=1] THEN  M81L62
IF [EQUAL=2] THEN  M81L63



M80L62
[GROOVEQTY=(FIX((PIECE_WIDTH-(FIXFIRST+MINLAST))/SPACING)+1)]
[FIRSTPOS=FIXFIRST]
M81L64

M80L63
[GROOVEQTY=(FIX((PIECE_WIDTH-(MINFIRST+MINLAST))/SPACING)+1)]
[FIRSTPOS=((PIECE_WIDTH-(SPACING*(GROOVEQTY-1)))/2)]



M80L64
[CLS]
[PRINT "V Groove SPECIFICATION:"]
[PRINT "-----------------------"]
[Print "The Sheet you are about to Cut is: " + STR$(SHEET_LENGTH) + " mm Long"]
```

```
[Print "The Sheet you are about to Cut is: " + STR$(SHEET_WIDTH) + " mm Wide"]
[Print "The Piece you are about to Cut is: " + STR$(PIECE_LENGTH) + " mm Long"]
[Print "The piece you are about to Cut is: " + STR$(PIECE_WIDTH) + " mm Wide"]
[Print "QTY of Grooves is: " + STR$(GROOVEQTY)]
[Print "The Calculated First Groove Position is: " + STR$(FIRSTPOS) + " mm"]

[Print "User Defined Min First Groove is: " + STR$(MINFIRST) + " mm"]
[Print "User Defined Min Last Groove is: " + STR$(MINLAST) + " mm"]
[Print "User Defined Fixed First Groove is: " + STR$(FIXFIRST) + " mm"]


[WINDOW ON]
M00 (program pause - does not stop spindle)
[WINDOW OFF]


[COUNTER=GROOVEQTY]


G90 G00 X[READTOOLRAD+10]Y[0-FIRSTPOS] (Position for first groove)
   G00 Z[Z_START]
   G01 Z[DADOTOOLDEPTH] F[DADOTOOLPSPEED]

M80L65

G91 G01 X[0-(PIECE_LENGTH+(2*READTOOLRAD)+10)] F[DADOTOOLFSPEED]

[COUNTER=COUNTER-1]


IF [COUNTER=0] THEN M81L70


G91 G00 Y[0-SPACING]
   G01 X[(PIECE_LENGTH+(2*READTOOLRAD)+10)] F[DADOTOOLFSPEED]

[COUNTER=COUNTER-1]

IF [COUNTER=0] THEN M81L70

IF [COUNTER>0] THEN M81L66
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```
M80L66
G91 G00 Y[0-SPACING]
M81L65


M81L70   (Jump to V Groove Tool Operation Area)


(END - V Groove X Axis Directional Dado Cutting Routine)
(-------------------------------------------------------)
(-------------------------------------------------------)


(#############################################################)
(#############################################################)
(#############################################################)

M80L70




M80L90

[REP_COUNT=REP_COUNT-1]


IF [REP_COUNT=0] THEN M81L99
G990
G90G00Z0
M05
G00X0Y0
M81L30




M80L99

M80L999
G990
```

```
G90G00Z0
M05
G00X0Y0
M98PENDTIME.SUBL1
M02
```