Self-Replicating Milling Machine

Julian Leland, 2012
Swarthmore College
E90 Senior Design Project
<table>
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<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
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</table>

Make 2x

Cut to roughly 12". Note that sides of rail are hardened - difficult to cut.

Notes:

Q.A.

Cut to length at 12". Note that sides of rail are hardened - difficult to cut. Note 2x

Comments:

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES

FRACTIONAL

ANGULAR MACHING

BEND 

THREE PLACE DECIMAL

TWO PLACE DECIMAL

INTERPRET GEOMETRIC TOLERANCING PER

COMMENTS:

NOTE:

12 in - EGR15U

DATE

ENG APPr.

MFG APPr.

Q.A.

DRAWN

CHECKED

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES

TOLERANCES

FRACTIONAL

ANGULAR MACHING

BEND 

THREE PLACE DECIMAL

TWO PLACE DECIMAL

INTERPRET GEOMETRIC TOLERANCING PER

COMMENTS:

NOTE:

12 in - EGR15U

DATE

ENG APPr.

MFG APPr.

Q.A.

DRAWN

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FRACTIONAL

ANGULAR MACHING

BEND 

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COMMENTS:

NOTE:

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Q.A.

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COMMENTS:

NOTE:

12 in - EGR15U

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ENG APPr.

MFG APPr.

Q.A.

DRAWN

CHECKED
Pre-cut size - 220mm long. No machining required.
MAKE 1 COPY OF PART WITH SET OF 8 .375" HOLES, BUT NO .375" HOLES ON TOP OF PART. MAKE 2 COPIES WITH .375 HOLES ON TOP OF PART, BUT WITHOUT 8 x .375 HOLE PATTERN.
ANGLES MAY BE APPROXIMATELY CUT. REFERENCE FIRST HOLE POSITION PRECISELY FROM DATUM A AND APPROXIMATELY FROM BOTTOM CORNER.

ALL HOLES Ø 0.500 THRU

DIMENSIONS ARE IN INCHES. TOLERANCES: FRACTIONAL PER (

ANGLES MAY BE APPROXIMATELY CUT. REFERENCE FIRST HOLE POSITION PRECISELY FROM DATUM A AND APPROXIMATELY FROM BOTTOM CORNER.

ALL HOLES Ø 0.500 THRU

DIMENSIONS ARE IN INCHES. TOLERANCES: FRACTIONAL PER (
4 x Ø 0.130 THRU M4x0.7 - 6H THRU

4 x Ø 0.159 THRU 10-32 UNF THRU
DRILL HOLE THROUGH CENTER OF .5 - 20 SHCS. MAY DRILL SLIGHTLY OVERRIZE TO ALLOW CLEARANCE FOR LEAD SCREW.

\( \phi 0.375 \text{ THRU ALL} \)

1.000

0.500

DO NOT SCALE DRAWING
NOTE ORIENTATION OF WELD BEAD RELATIVE TO HOLES. IF BEAD IS ON LONG SIDE OF PIPE, ORIENT TO SIDE WITH ONLY 4 HOLES.

DIMENSIONS ARE IN INCHES.

TOLERANCES: FRACTIONAL

DIMENSIONS ARE IN INCHES.

TOLERANCES: TWO PLACE DECIMAL

COMMENTS:

HOLES TO SIDE WITH ONLY 4 LONG SIDE OF PIPE, ORIENT HOLES. IF BEAD IS ON
2 x Ø 0.213 THRU
1/4-28 UNF THRU

Dimensions are in inches.

Title: Rail Clamp Mount Plate

Scale: 1:1

Material
Finish

Drawn
Checked
ENG APPR.
MFG APPR.
Q.A.

Title Block:

Comments:

Do not scale drawing.
ANGLE MEASUREMENT AND ACCOMPANYING CONSTRUCTION LINES ARE FOR USE WITH MANUAL ROTARY TABLE. ORIGIN OF PLATE SHOULD BE SET AT CENTER OF ROTARY TABLE, AND TABLE SHOULD BE ROTATED 30 DEG. TO CUT ANGLED SLOTS.
0.500

2 x ∅ 0.332 THRU
3/8-24 UNF THRU
2 x Ø 0.332 THRU 3/8-24 UNF THRU
2 x Ø 0.332 THRU
3/8-24 UNF THRU

THIN AS NEEDED WITH SANDER
NOTE LOCATION OF WELD BEAD RELATIVE TO HOLES. IF WELD IS ON SIDE, PLACE ON SIDE OF PART WITH ONLY 4 HOLES.
DIMENSIONS OF SLOT ARE IDENTICAL TO OTHER - LOOSE FIT TO 1/4" SHCS

2 x Ø 0.098 THRU ALL
M4x0.7 - 6H THRU ALL

2 x Ø 0.130 THRU ALL
M4x0.7 - 6H THRU ALL

3 x Ø 0.098 T 0.590
M3x0.5 - 6H T 0.240

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL
ANGULAR: MACH
THREE PLACE DECIMAL

COMMENTS:
DO NOT SCALE DRAWING

MATERIAL
FINISH

DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.

INTERPRET GEOMETRIC DIMENSIONS PER

REVISION

Q.A.

NOTE: ShortBearingRailClampV2 - FinalDesign

4/10/12

LELAND

DWG. NO.
UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL
ANGULAR: MACH
THREE PLACE DECIMAL

COMMENTS:
DO NOT SCALE DRAWING

MATERIAL
FINISH

DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.

INTERPRET GEOMETRIC DIMENSIONS PER

REVISION

Q.A.

NOTE: ShortBearingRailClampV2 - FinalDesign

4/10/12

LELAND

DWG. NO.
UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL
ANGULAR: MACH
THREE PLACE DECIMAL

COMMENTS:
DO NOT SCALE DRAWING

MATERIAL
FINISH

DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
Spindle Gib Mount

Dimensions are in inches. Tolerances: fractional, angular: mach bend. THREE PLACE DECIMAL. Appropriate fasteners (M8 x 50) are required.

Make 1x. Cut existing gib mount to specified thickness. Purchase appropriate fasteners (M8 x 50). USE 2.238.

Comments:
Spindle Column

DIMENSIONS ARE IN INCHES

TOLERANCES: FRACTIONAL
ANGULAR: MACH BEND
THREE PLACE DECIMAL: 0.001

TWO PLACE DECIMAL: 0.000

UNLESS OTHERWISE SPECIFIED:

B SCALE: 1:2

MATERIAL
FINISH

DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.

COMMENTS:

DO NOT SCALE DRAWING

CUT THIS END - SHOULD BE END OPPOSITE END WHERE RACK ATTACHES TO COLUMN

0.500 THRU

0.500 THRU
Title: Top Outside Plate - Final Design

Dimensions are in inches.

Tolerances:
- Fractional
- Angular machining: Send to Mfg.
- Three places decimal: 0.001

Comments:
- DO NOT SCALE DRAWING

Note: Unless otherwise specified, use a scale of 1:2.

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
TOLERANCES
FRAC TOL: 0.001
ANGULAR TOL: SEND TO MANU.
THREE PLACE DECIMAL: 0.001

TITLE: THREE PLACE DECIMAL TOLERANCING PER:

MATERIAL
FINISH

DRAWN
CHECKED
ENG APPR.

ENG APPR.

DRAWN: 1/3/2013
CHECKED: 1/3/2013
ENG APRR.

Q.A.

COMPLAC:
Mfg. 3a

DIMENSIONS ARE IN INCHES
TOLERANCES:
- FRACTIONAL
- ANGULAR: MACH
- THREE PLACE DECIMAL: 0.001

Comments:
- DO NOT SCALE DRAWING

Note: Unless otherwise specified, use a scale of 1:2.
SLOT DIMENSIONS ARE IDENTICAL

2 x Ø 0.130 THRU ALL
M4x0.7 - 6H THRU ALL

3 x Ø 0.098 ± 0.590
M3x0.5 - 6H ± 0.240

HOLE ON ONE COPY ONLY

3/8-24 UNF ± 0.500

Unless otherwise specified:

DIMENSIONS ARE IN INCHES
TOLERANCES
FRACTIONAL
ANGULAR TOLERANCES
TWO PLACE DECIMAL
THREE PLACE DECIMAL

MATERIAL
FINISH

DRAFT
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS

Make 2x. Observe differences between parts (detail above).

TopShortBearingRailClampV2 - Left - FinalDesign

SCALE: 1:1

WGT

REV

B

Sheet 1 of 1

DWG. NO.

NAME

DATE
0.380 THRU

0.453 T 0.478
1/2-20 UNF T 1.000

0.194 THRU ALL

R0.0625 T 0.8500