ROLL-KRAFT®

ON-TIME DELIVERY. FIRST-TIME PERFORMANCE.

TUBE, PIPE & ROLL FORMING TOOLING | TRAINING

CUSTOMER TOOLING SETUP PACKAGE

98% ON-TIME DELIVERY

97% FIRST-TIME PERFORMANCE

On-Time Delivery. First-Time Performance.

Thank you for choosing Roll-Kraft for your tooling needs. We are committed to delivering your product on the agreed upon delivery date. While we understand that, on rare occasions, circumstances may prevent on-time delivery, we are dedicated to doing our best to never miss a delivery date request. Be assured that even with our already ***98% on-time delivery*** performance rate, we are in constant pursuit of improving this number.

Roll-Kraft is very proud that over the past two years, we have achieved an industry-leading ***97% first-time performance*** rate right out-of-the-box for our customers. To help ensure our product achieves first-time performance for you, we have provided information from our engineering and technical teams to guarantee our product will perform to your expectations.

Roll-Kraft is dedicated and committed to improving these already industry-leading averages, allowing our customers to ***experience first-time performance and on-time delivery rates unmatched by any competitor in the industry***.

In this package, you'll find:

- **Standard Operating Procedures** – A step-by-step guide for best results.
- **Roll Tryout Record** – If our technicians have tested your rolls on our in-house equipment, we have provided our notes to achieve optimal performance.
- **Drawings** – All of your drawing records for your tooling.

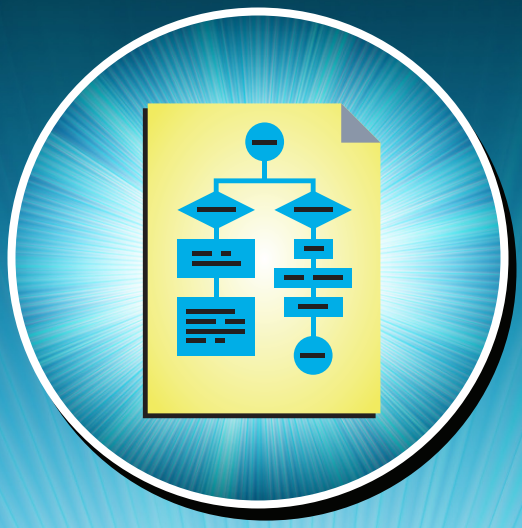
We hope that you find the contents of this package valuable, and that it helps you get your new tooling up and running in the most efficient manner possible.

If you have any questions, please do not hesitate to call us directly at 888-953-9400 and a live operator will direct your call to the appropriate party to get you a quick answer. Alternatively, visit roll-kraft.com for a full archive of technical resources including articles and videos. You'll also have access to our Ask the Doctor feature for fast responses to any technical question you may have.

Thank you again for choosing Roll-Kraft and we look forward to serving your tooling needs in the future.

Sincerely,

Chuck Gehrisch
President
Roll-Kraft



STANDARD OPERATING PROCEDURES

1. Setup Procedures

A) Obtain a setup chart and/or roll tooling drawings for the job.

ROLL TOOLING SET-UP CHART

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KEY
SPACER
"A" ROLL
Z SPACER
HORSESHOE SPACER

Customer:
Job #: **102608-04**
Section: **Stud / Track**
Strip Width: **6.250"**

STAND	ROLL GAP REF.		INBOARD ROLLS, SPACERS, & SHIMS				"W" GAP	OUTBOARD ROLLS, SPACERS, & SHIMS					ROLL GAP REF.
1	MAT'L THK	DRIVE SIDE	1RT1	1RT2			SEE CHART			1LT2	1LT1	OPERATOR SIDE	MAT'L THK
			1RB1	1RB2						1LB2	1LB1		
2	MAT'L THK		2RT1	2RT2			SEE CHART			2LT2	2LT1		MAT'L THK
			2RB1	2RB2						2LB2	2LB1		
3	MAT'L THK		3RT1	3RT2			SEE CHART			3LT2	3LT1		MAT'L THK
			3RB1	3RB2						3LB2	3LB1		
4	MAT'L THK		4RT1	4RT2			SEE CHART			4LT2	4LT1		MAT'L THK
			4RB1	4RB2						4LB2	4LB1		
5	MAT'L THK		5RT1	5RT2			SEE CHART			5LT2	5LT1		MAT'L THK
			5RB1	5RB2						5LB2	5LB1		
6	MAT'L THK		6RT1	6RT2			SEE CHART			6LT2	6LT1		MAT'L THK
			6RB1	6RB2						6LB2	6LB1		
7	MAT'L THK		7RT1	7RT2			SEE CHART			7LT2	7LT1		MAT'L THK
			7RB1	7RB2						7LB2	7LB1		
8	MAT'L THK		8RT1	8RT2			SEE CHART			8LT2	8LT1		MAT'L THK
			8RB1	8RB2						8LB2	8LB1		
9	MAT'L THK		9RT1	9RT2			SEE CHART			9LT2	9LT1		MAT'L THK
			9RB1	9RB2						9LB2	9LB1		
10	MAT'L THK		10RT1	10RT2			SEE CHART			10LT2	10LT1		MAT'L THK
			10RB1	10RB2						10LB2	10LB1		
11	MAT'L THK		11RT1	11RT2			SEE CHART			11LT2	11LT1		MAT'L THK
			11RB1	11RB2	11RB3	11RB4		11B4	11LB3	11LB2	11LB1		
12	MAT'L THK		12RT1	12RT2			SEE CHART			12LT2	12LT1		MAT'L THK
			12RB1	12RB2	12RB3	12RB4		12B4	12B3	12LB2	12LB1		
13	MAT'L THK		13RT1	13RT2			SEE CHART			13LT2	13LT1		MAT'L THK
			13RB1	13RB2	13RB3	13RB4		13LB4	13LB3	13LB2	13LB1		

B) Thoroughly read the shop order to determine what is needed to complete the order.

C) Check the availability of the material needed for the job.

D) Inform the tooling department of the appropriate roll tooling (and dies) that are needed.

E) Set up the rolls as quickly and accurately as possible.

F) Measure and note the actual thickness of the coil to be formed.

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G) Set all the gaps between the rolls to the material thickness measured in previous step.

H) Inspect all rolls using a mirror and a piece of white paper tilted at a 45° angle. This will shine light between the rolls so the clearances between the top and bottom rolls can be viewed.

I) If there is an alignment issue with the rolls, temporarily fix the problem with shims until machine's alignment can be corrected.

J) Set the entry table to the proper height and align the guides by using a straightedge to check for perpendicularity and parallelism.

K) If the tooling set has fixtures or side rolls, the stand heights should ideally be set using a dial indicator. This will ensure that the rolls are set at the proper heights when the strip is fed through the mill.

L) To center the side rolls, use a straightedge and set it on a flat surface from the pass before or after the side stand and adjust the center of the vertical posts so that the distance is equal on both sides of the roll from the flat surface.

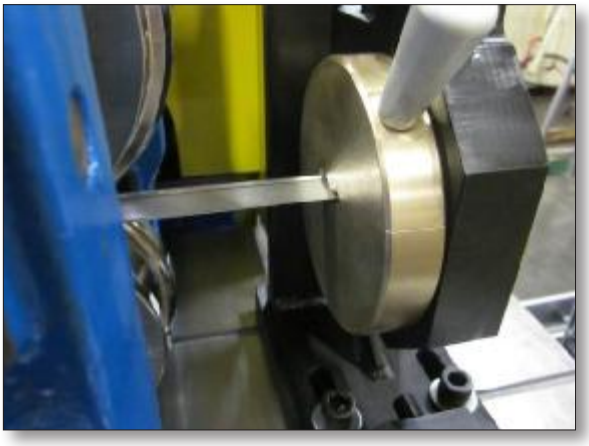
M) Cut a 45° angle on each side of the beginning/entry end of the coil and thread the strip through the entry table and into the first pass.

N) While the material is in the first pass, adjust the roll gaps again by putting a feeler gauge between the outside (gauging) flanges of the top and bottom rolls. This gap is usually the same gap as the thickness of the material being formed. By resetting the gaps with the material in the rolls, the bearing slop in the housings is eliminated. This will also ensure that the rolls are level and set to the proper thickness to get a good profile. While adjusting the pressure up or down, jog the mill one to two inches forward to allow the material to seat in the rolls. NEVER SKIP THIS STEP! If the rolls are not adjusted in this manner, some rolls will be too loose or too tight and cause twist, bow, camber and other issues while running production.

O) Continue this process until the tooling has been adjusted in every pass. For safety reasons, ensure the rolls are adjusted on the exit side.

P) Run a three-foot long piece out of the mill and cut it off. Check the dimensions of the profile and compare them to dimensions on the section drawing. If adjustments are necessary, make them in the key control passes indicated on the appropriate roll tooling prints in order to bring the section to print.

Q) Once the section is to print and close to being straight out of the rolls, add the straightener to adjust for straightness. The section should come out as straight and level as possible without a significant amount of adjustment to the straightener. If over-adjustment of the straightener is necessary, there may be trouble keeping the profile straight while running production.



Three-way straightener

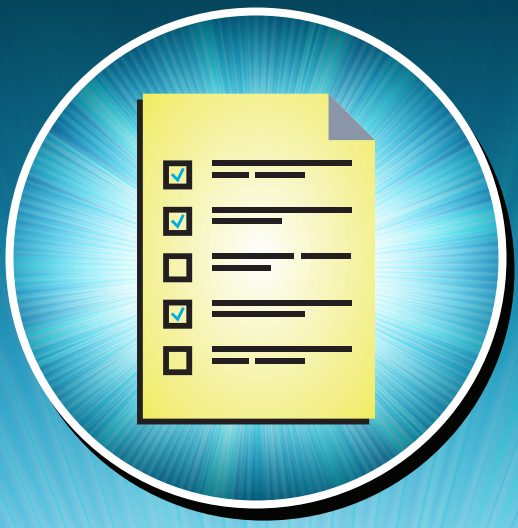
Five-way straightener

R) After the section is properly adjusted for dimensions and straightness, set the shut height on the cutoff press up to the 12” piece. Align the cutoff: matching the alignment of the 12” piece and to the profile coming out the mill. Make sure the two pieces are perfectly in line with each other front to back and up and down. Finally, lock the press down and get ready for a good day of production.

2. Production Procedures

A) Have the quality department thoroughly inspect and approve the profile before running production. This will be the final opportunity to check and ensure you have an acceptable profile before running in full production mode.

B) While the product is running, it is recommended that the material thickness be checked three to four times per coil. This will be beneficial if problems arise with straightness or profile dimensions.



ROLL TRYOUT RECORD

ROLL TRYOUT RECORD

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Shop Order Number: 103914-01

Customer: -

Date: 2/7/2014

Ship Date: 2/7/2014

Engineer: -

Technician: -

Test notes:

103914, 4APN Version 1

This job was set-up on the Yoder 1.5 rafts. 15 passes.

Tryout material received measured 3.844 x .020
Gauged mill at .022 and threaded material through. There was a sliver of material bleeding out of the rib side of the profile. Gauged passes 1 thru 5 down to .020 to utilize the over-form in these passes. This consumed more of the strip and eliminated the bleeding out.

Set the remainder of the passes to gauge and continued working the set-up. Reworked pass 15 to allow the gap to be closed. This need to finish at .020 and is currently measuring around .250

Rework of pass 15 allowed control to close the gap. We also added a wood guide, in-between pass 14 -15, to apply pressure to the bottom of the profile (on the bead side of the project); to eliminate wave.

Installed twist straightener, after pass 15, to control twist in the profile. Working the straightener allowed for a nice straight, flat part; however as the twist was worked out the counter effect was the gap began to open back up. The more you worked the straightener for twist the more the gap opened.

Dave R. recommended trying a twist straightener in-between pass 14 -15 to control twist and allow the rework in pass 15 to control the gap opening. We applied a trunnion style straightener, with a home made wood block for this test. We also removed the wood guide for wave; as the twist straightener will provide this benefit as well.

Worked with this set-up and was able to produce a flat, twist free part, with acceptable gap dimensions.

Re-installed (in a make shift manner) the original straightener block after pass 15. Worked this slightly to remove bow and camber and product parts for approval sub
Mission. Sent 2 samples to customer on 1/31/14.

Customer approval received 2/4/14

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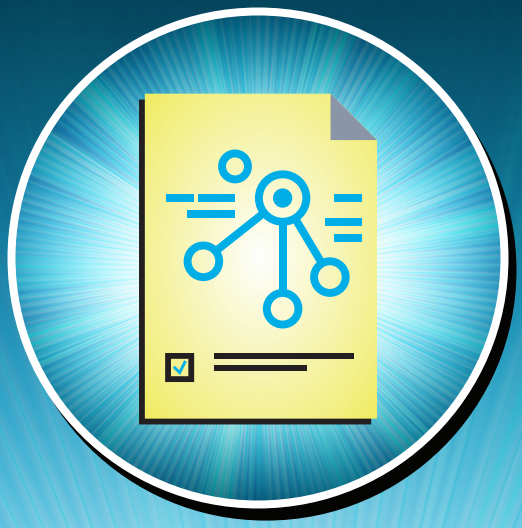


TOOLING DRAWINGS

TOOLING DRAWINGS

ESTIMATED STRIP WIDTH

3.843 x .021

NOTE: THE ESTIMATED STRIP WIDTH IS FOR TEST PURPOSES ONLY. THE ACTUAL STRIP WIDTH WILL BE DETERMINED BY TEST.

MILL SPECIFICATIONS

GEAR RATIO	-- Equal
BORE DIA.	-- 1.5005/1.5010
KEYWAY	-- .260/.265 x 5/32
ROLL SPACE	-- 10"
HORIZ. CTRS	-- 12"
VERT. CTRS.	-- 4-3/4 To 7-1/4
STOCK TRAVEL	-- Left To Right
℄ BOTT. TO MILL BED	-- 5"

MATERIAL SPECIFICATIONS

GAGE ~ .019 To .021 Painted
TYPE ~ Aluminum
YIELD ~

NOTE: ROLLS ARE DESIGNED TO MAX. GAGE. DIMENSIONS WILL VARY WITH GAGE RANGE

CROSS SECTIONAL TOL.

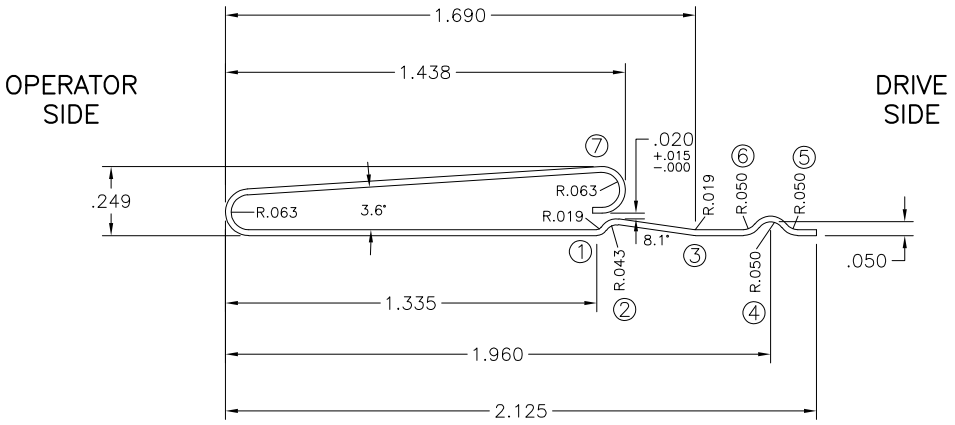
(UNLESS OTHERWISE SPECIFIED)

FRACTIONAL ~ 1/32
DECIMAL ~ .015
ANGLES ~ 1°

NOTE: ALL CROSS SECTIONAL MEASUREMENTS WILL BE TAKEN 6" FROM ENDS

ELECTRONIC FILE IS MASTER

TOP ROLLS



①	= 3° OVERFORM, CONTROL IN PASS #1
②	= 3° OVERFORM, CONTROL IN PASS #2
③	= 3° OVERFORM, CONTROL IN PASS #2
④	= 3° OVERFORM, CONTROL IN PASS #4
⑤	= 3° OVERFORM, CONTROL IN PASS #4
⑥	= 3° OVERFORM, CONTROL IN PASS #3
⑦	= 3° OVERFORM, CONTROL IN PASS #5

BOTTOM ROLLS

REV.	DATE	BY	DESCRIPTION
A	10/24/13	GS	CHANGED STRIP WIDTH TO CUSTOMER CURRENT (WAS 3.834)

CUSTOMER	–	MILL	TISHKEN	R.S.	See Chart
BORE	See Chart	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	See Chart	HARDEN	Rc 59-61	ROLL MATCH	.021

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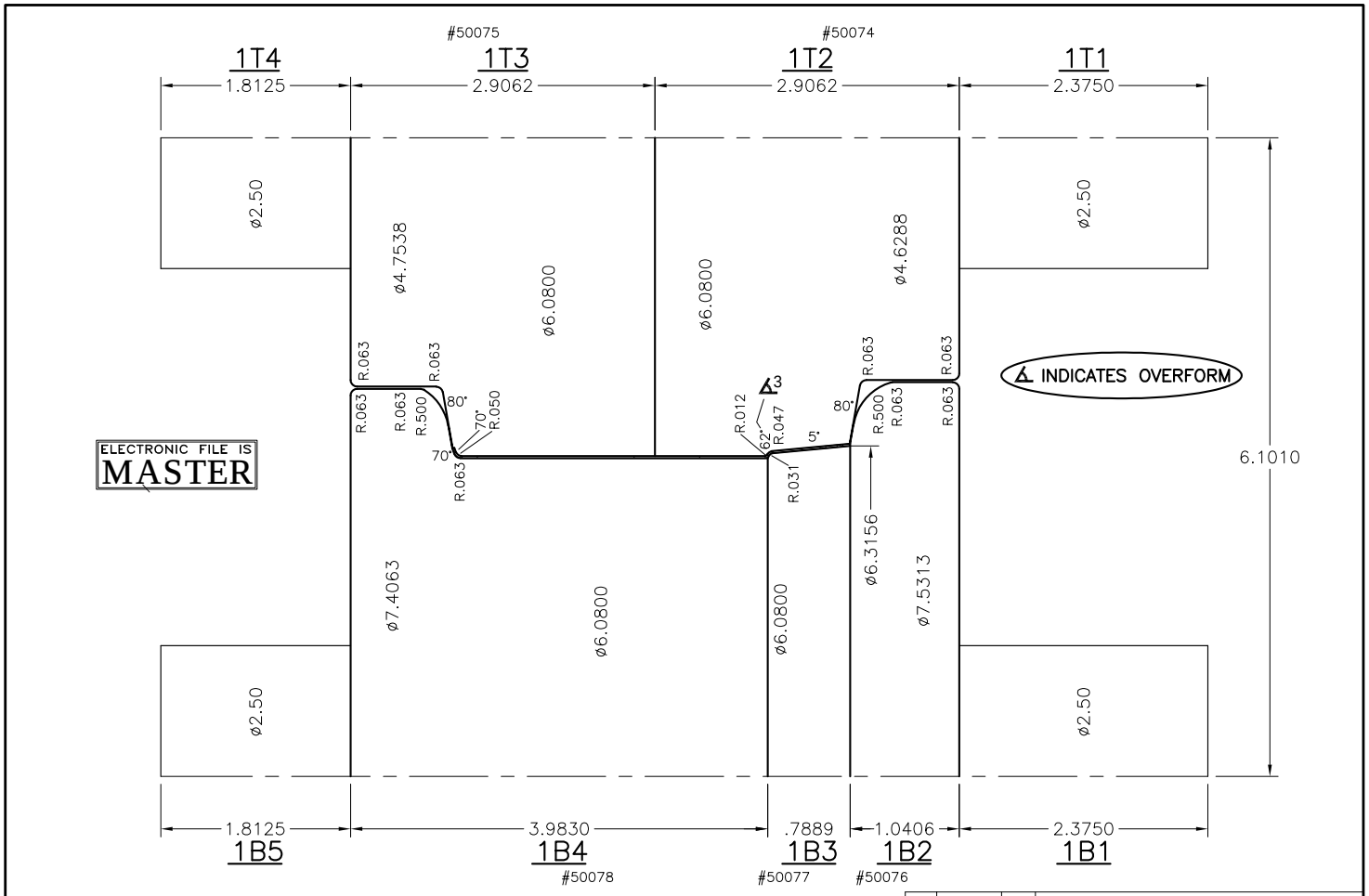
DATE	DES. BY	JOB NO.	PASS #	REV.
10/17/13	CL	103914-01	SECT	A

SCALE: 2 : 1

TOOLING DRAWINGS



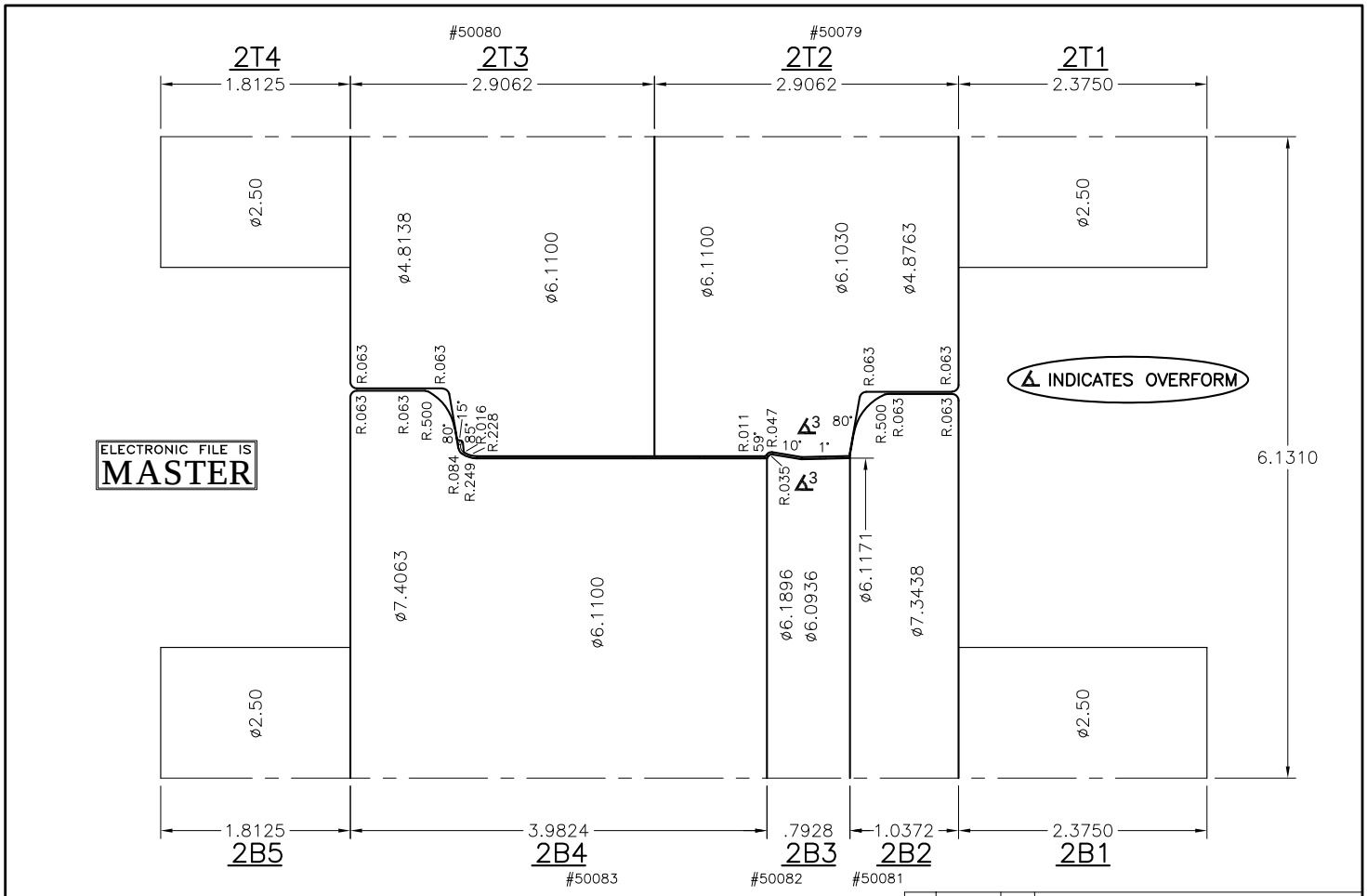
REV.	DATE	BY	DESCRIPTION

CUSTOMER –	MILL TISHKEN	R.S. 10"	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400
BORE 1.5005/1.5010	MATERIAL D2	SECTION 4APN VERSION 1	CERTIFIED TO ISO 9001:2008 WITH DESIGN
KEYWAY .260/.265 X 5/32	HARDEN Rc 59–61	ROLL MATCH .021"	

DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	01	–

SCALE: DNS

TOOLING DRAWINGS



REV.	DATE	BY	DESCRIPTION

CUSTOMER –	MILL TISHKEN	R.S. 10"	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE 1.5005/1.5010	MATERIAL D2	SECTION 4APN VERSION 1	
KEYWAY .260/.265 X 5/32	HARDEN Rc 59–61	ROLL MATCH .021"	

DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	02	–

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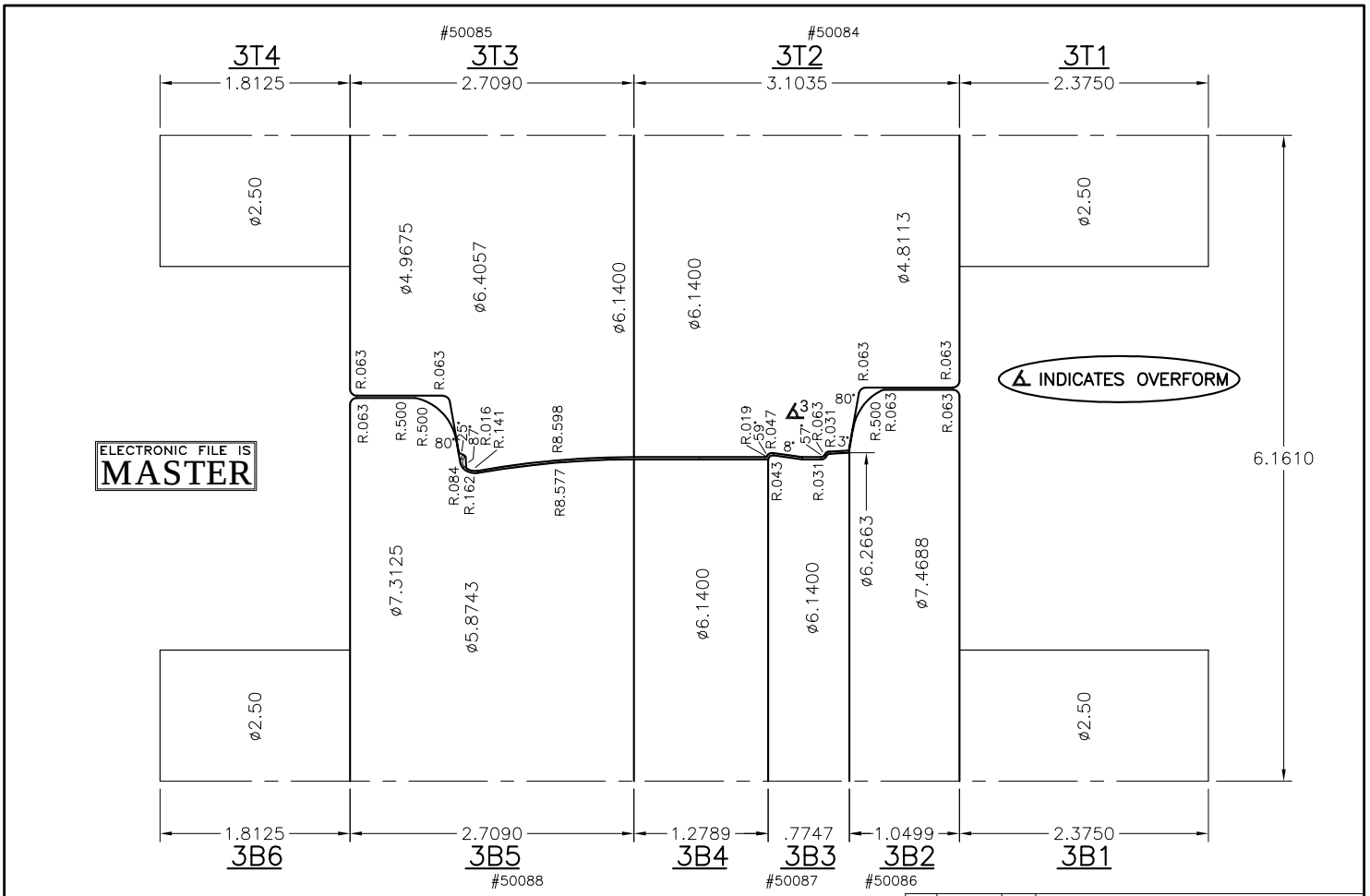
TOOLING DRAWINGS

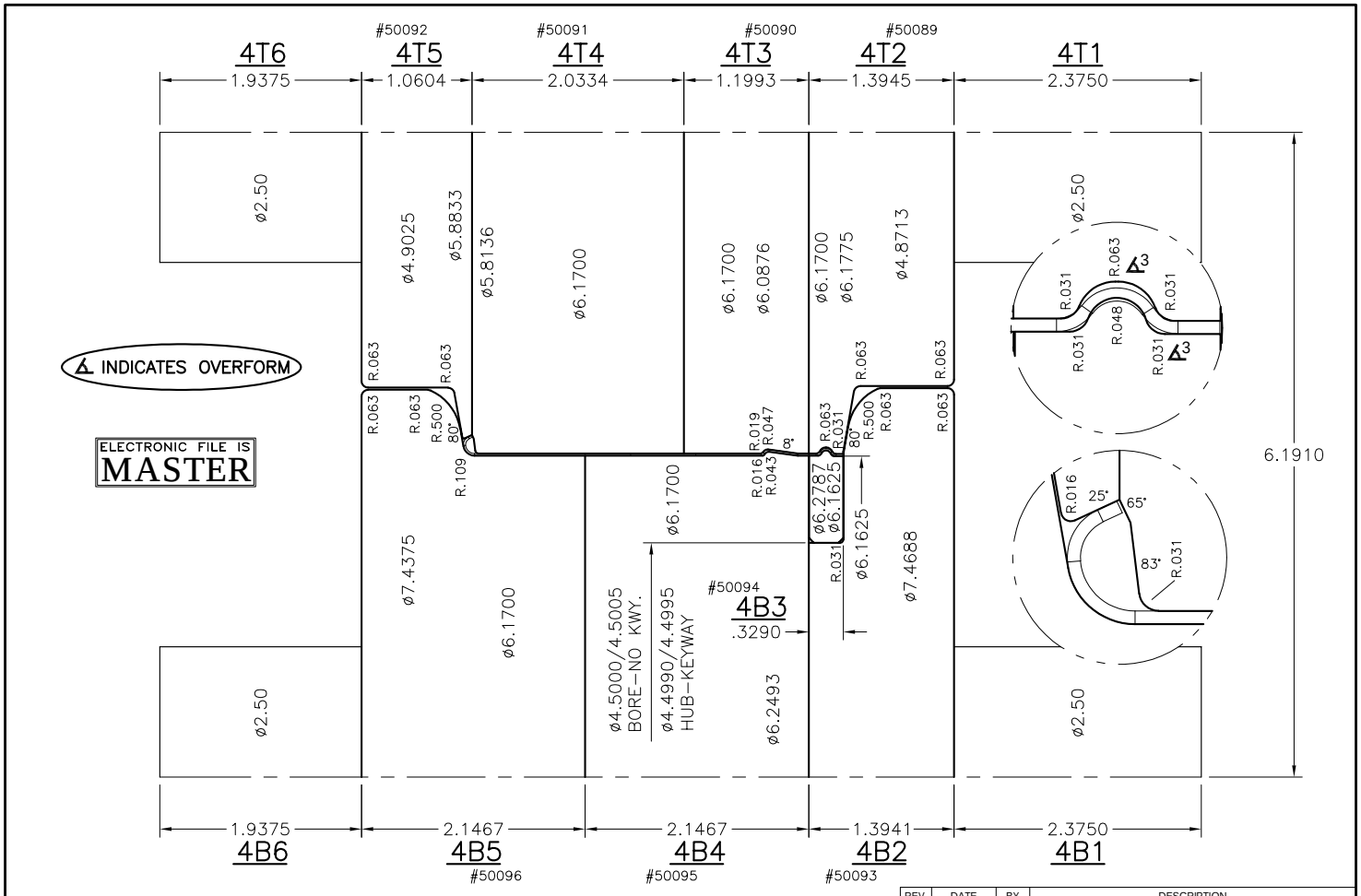


REV.	DATE	BY	DESCRIPTION

CUSTOMER: –	MILL: TISHKEN	R.S.: 10”	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 — CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE: 1.5005/1.5010	MATERIAL: D2	SECTION: 4APN VERSION 1	DATE: 25NOV13 | DES. BY: CL | JOB NO.: 103914–01 | PASS #: 03 | REV.: –
KEYWAY: .260/.265 X 5/32	HARDEN: Rc 59–61	ROLL MATCH: .021”	

SCALE: DNS

TOOLING DRAWINGS



REV.	DATE	BY	DESCRIPTION

CUSTOMER	–	MILL	TISHKEN	R.S.	10”
BORE	1.5005/1.5010	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	.260/.265 X 5/32	HARDEN	Rc 59–61	ROLL MATCH	.021”

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DATE	DES. BY	JOB NO.	PASS #	REV.
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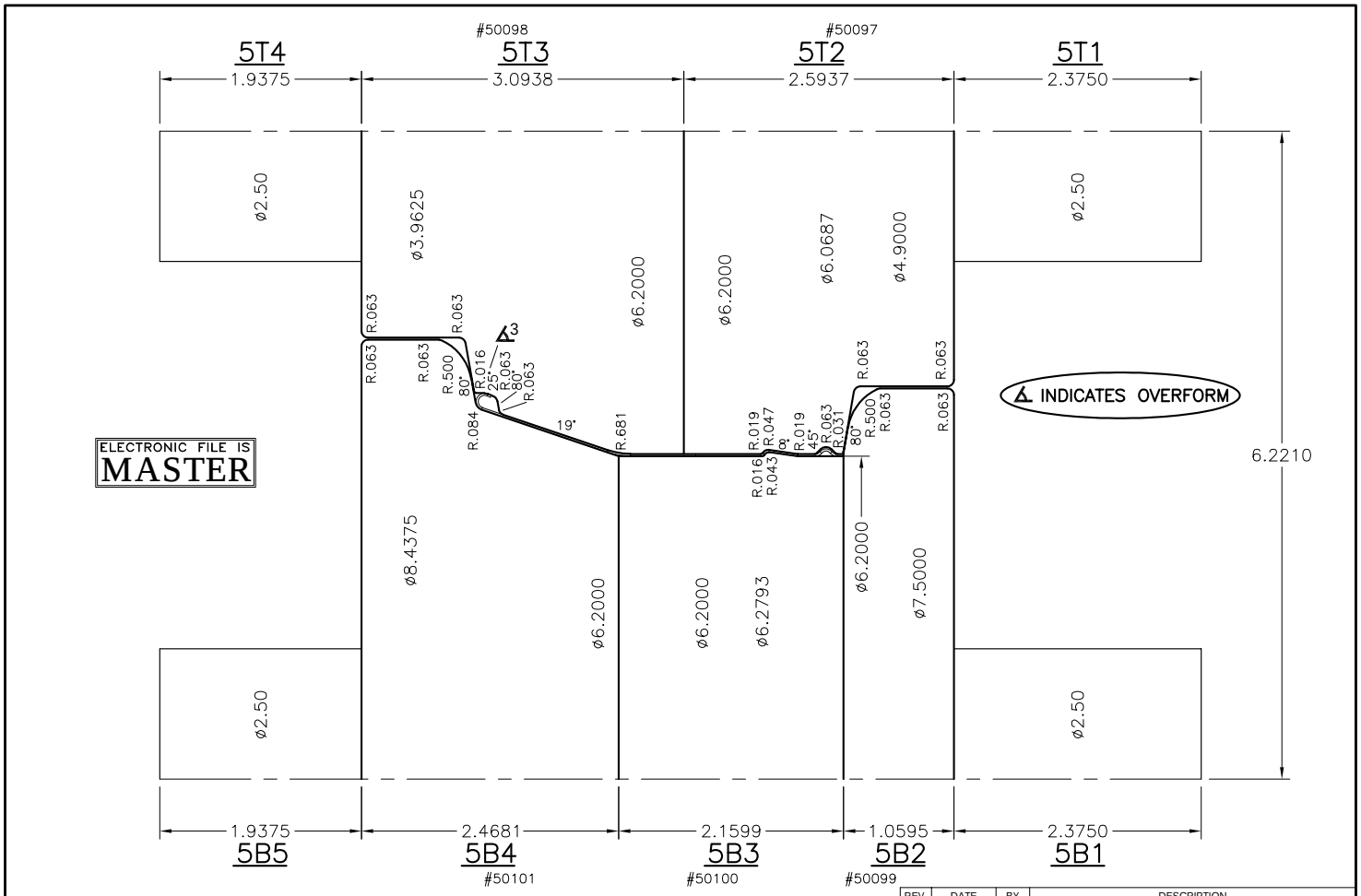

REV.	DATE	BY	DESCRIPTION

CUSTOMER	–	MILL	TISHKEN	R.S.	10”
BORE	1.5005/1.5010	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	.260/.265 X 5/32	HARDEN	Rc 59–61	ROLL MATCH	.021”

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DATE	DES. BY	JOB NO.	PASS #	REV.
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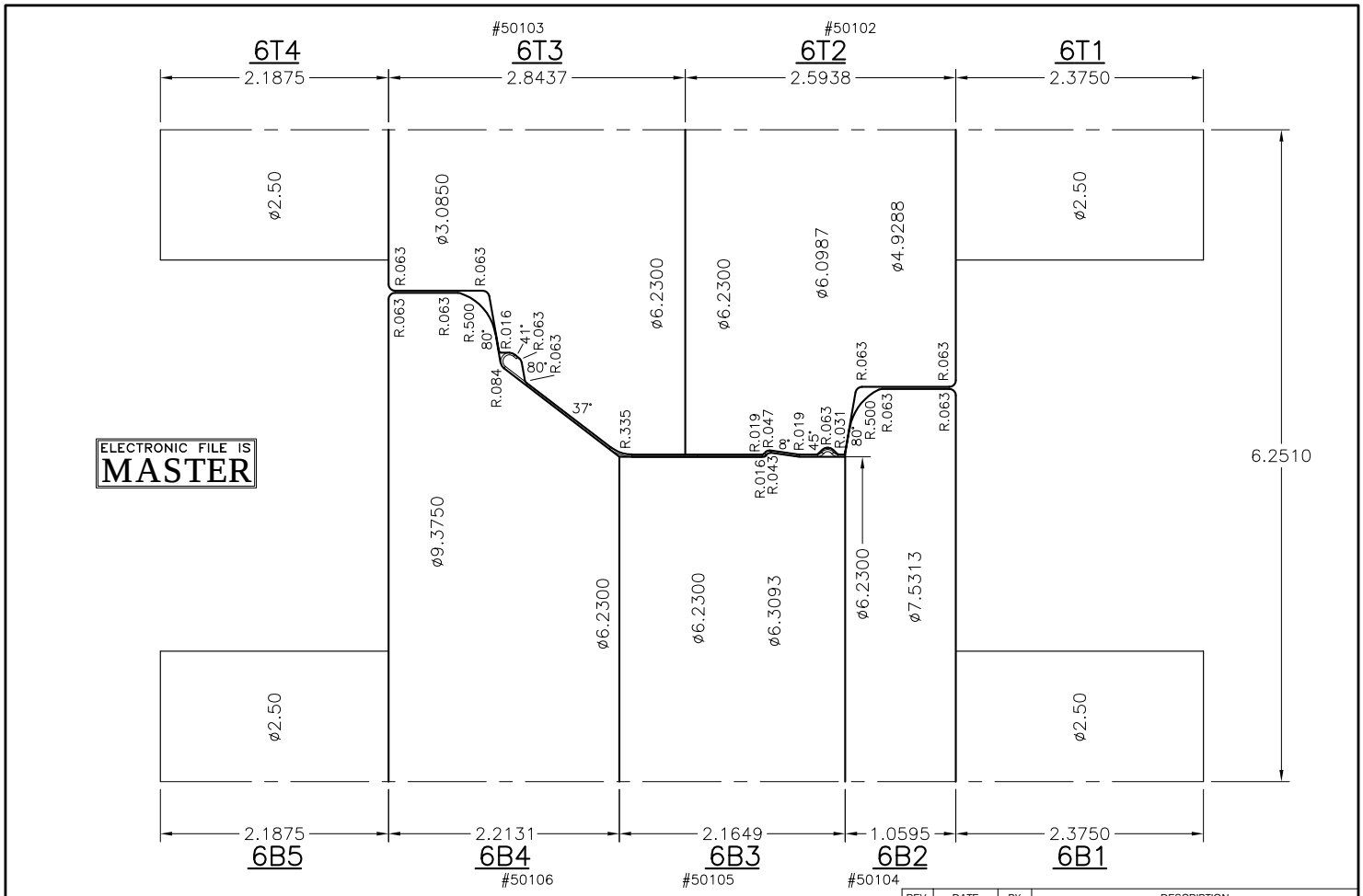

REV.	DATE	BY	DESCRIPTION

CUSTOMER	–	MILL	TISHKEN	R.S.	10"
BORE	1.5005/1.5010	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	.260/.265 X 5/32	HARDEN	Rc 59–61	ROLL MATCH	.021"

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DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	06	–

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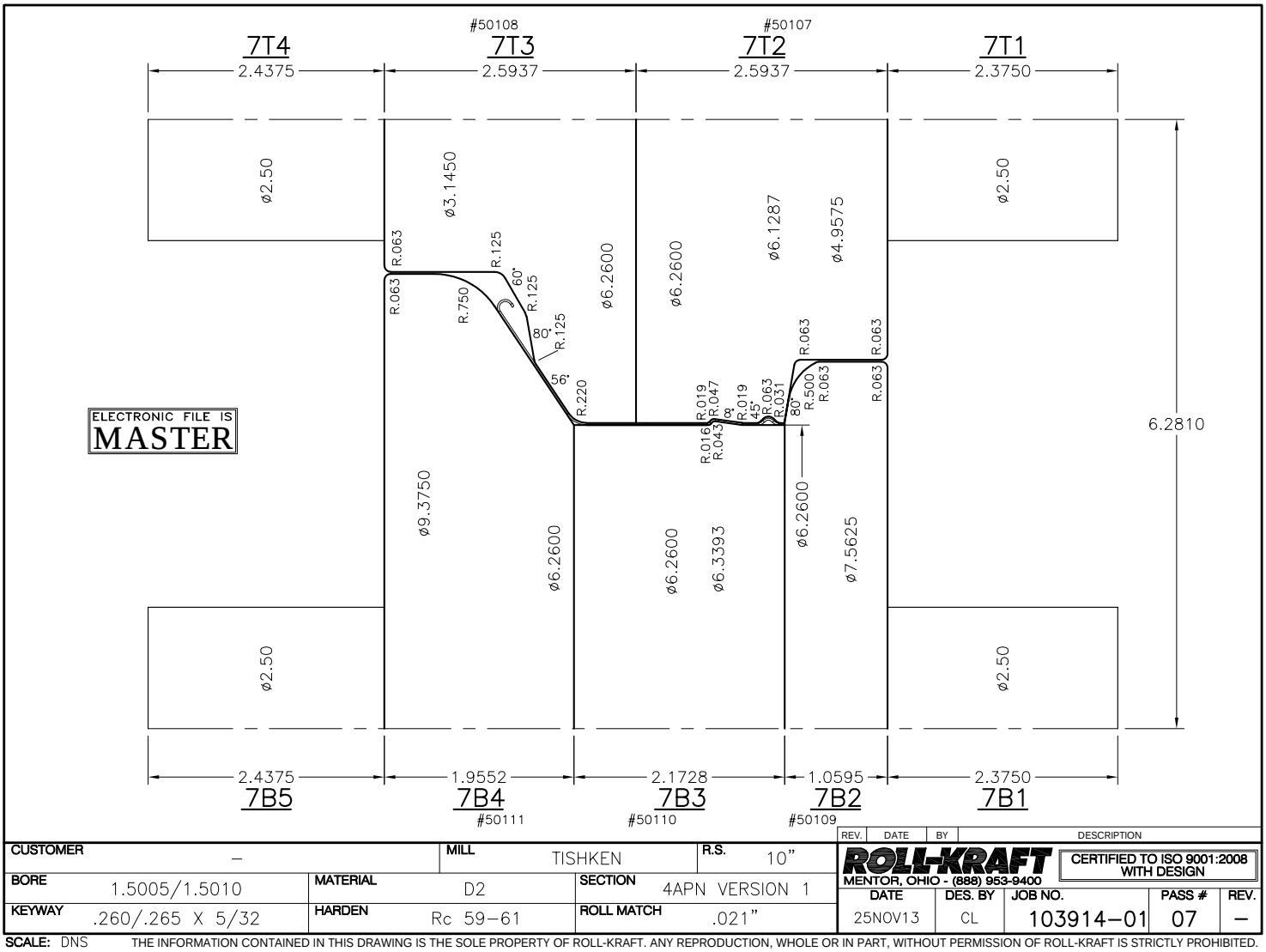

REV.	DATE	BY	DESCRIPTION

CUSTOMER	–	MILL	TISHKEN	R.S.	10”
BORE	1.5005/1.5010	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	.260/.265 X 5/32	HARDEN	Rc 59–61	ROLL MATCH	.021”

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DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	07	–

SCALE: DNS

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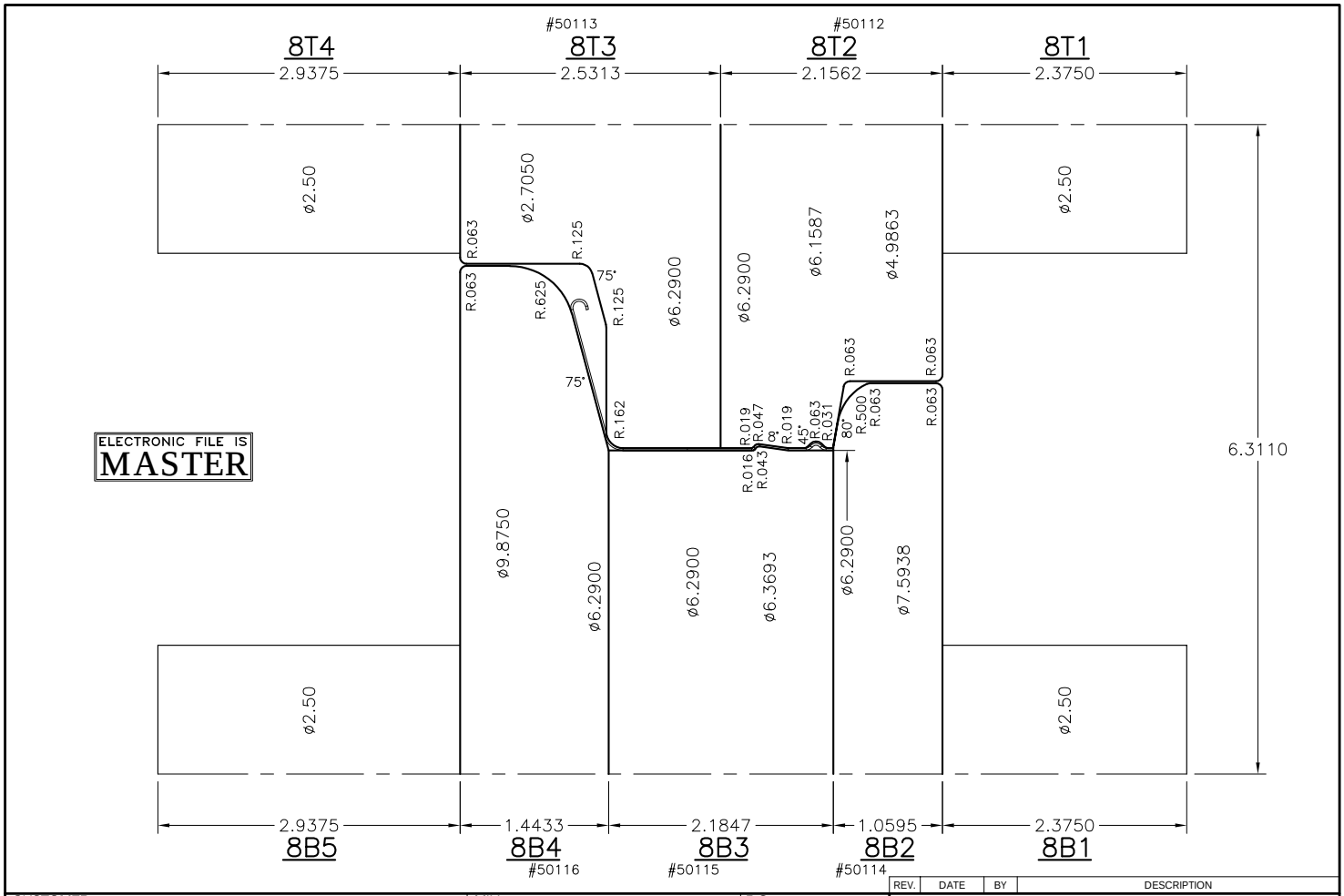

REV.	DATE	BY	DESCRIPTION

CUSTOMER –	MILL TISHKEN	R.S. 10"	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 — CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE 1.5005/1.5010	MATERIAL D2	SECTION 4APN VERSION 1	
KEYWAY .260/.265 X 5/32	HARDEN Rc 59–61	ROLL MATCH .021"	

DATE	DES. BY	JOB NO.	PASS #	REV.
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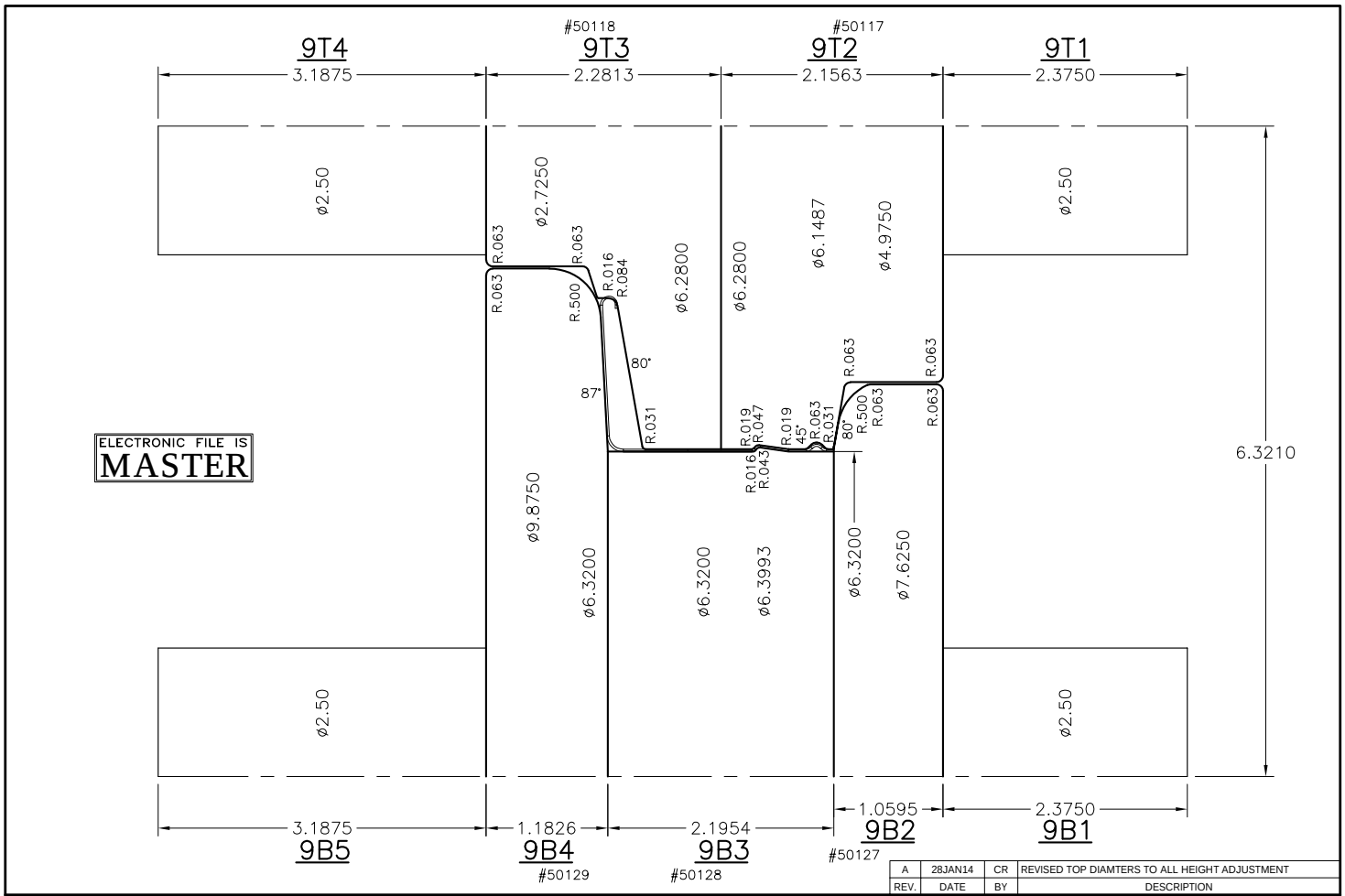
SCALE: DNS

TOOLING DRAWINGS



REV.	DATE	BY	DESCRIPTION
A	28JAN14	CR	REVISED TOP DIAMTERS TO ALL HEIGHT ADJUSTMENT

CUSTOMER	–	MILL	TISHKEN	R.S.	10”
BORE	1.5005/1.5010	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	.260/.265 X 5/32	HARDEN	Rc 59–61	ROLL MATCH	.021”

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DATE	DES. BY	JOB NO.	PASS #	REV.
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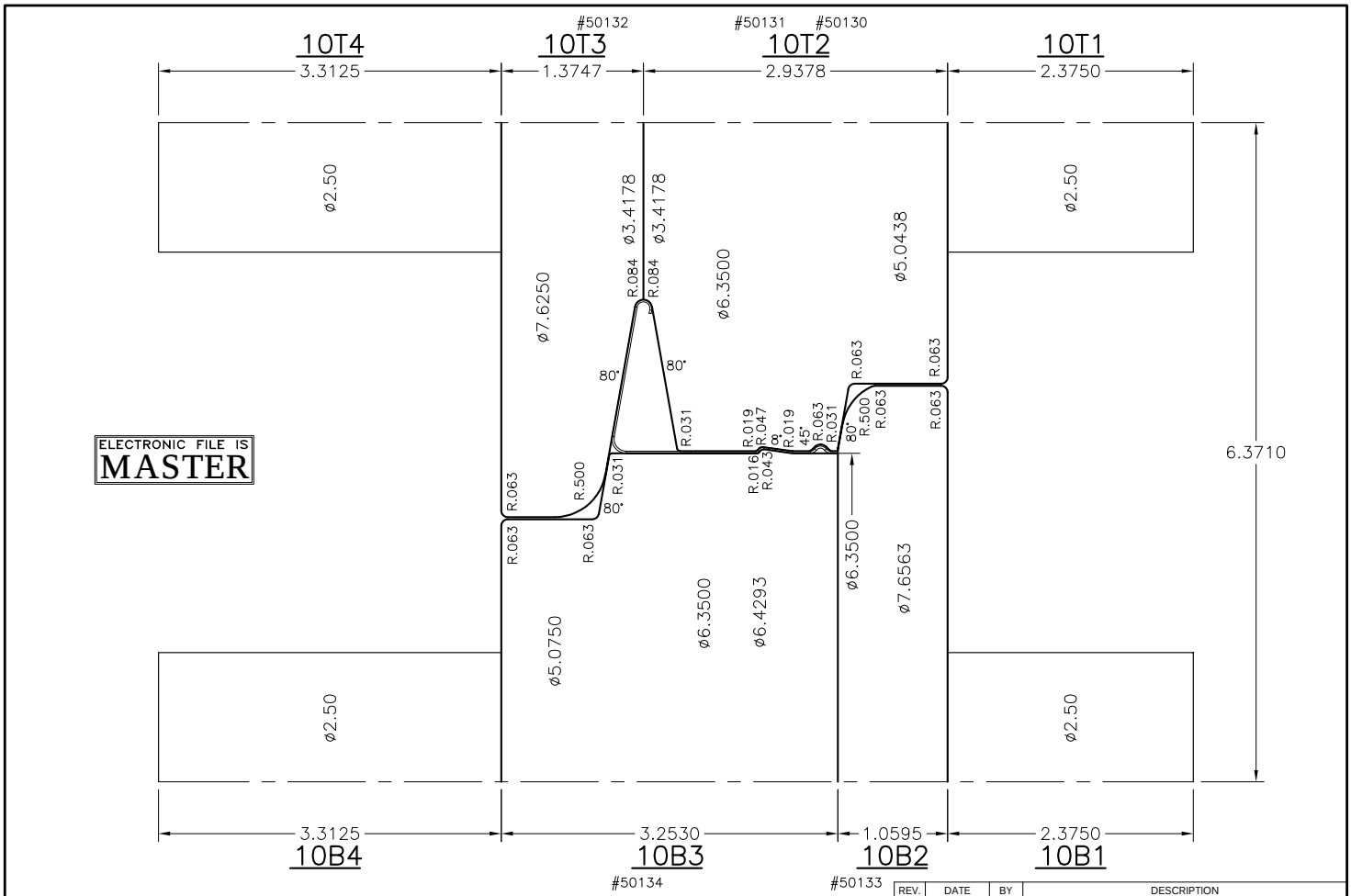

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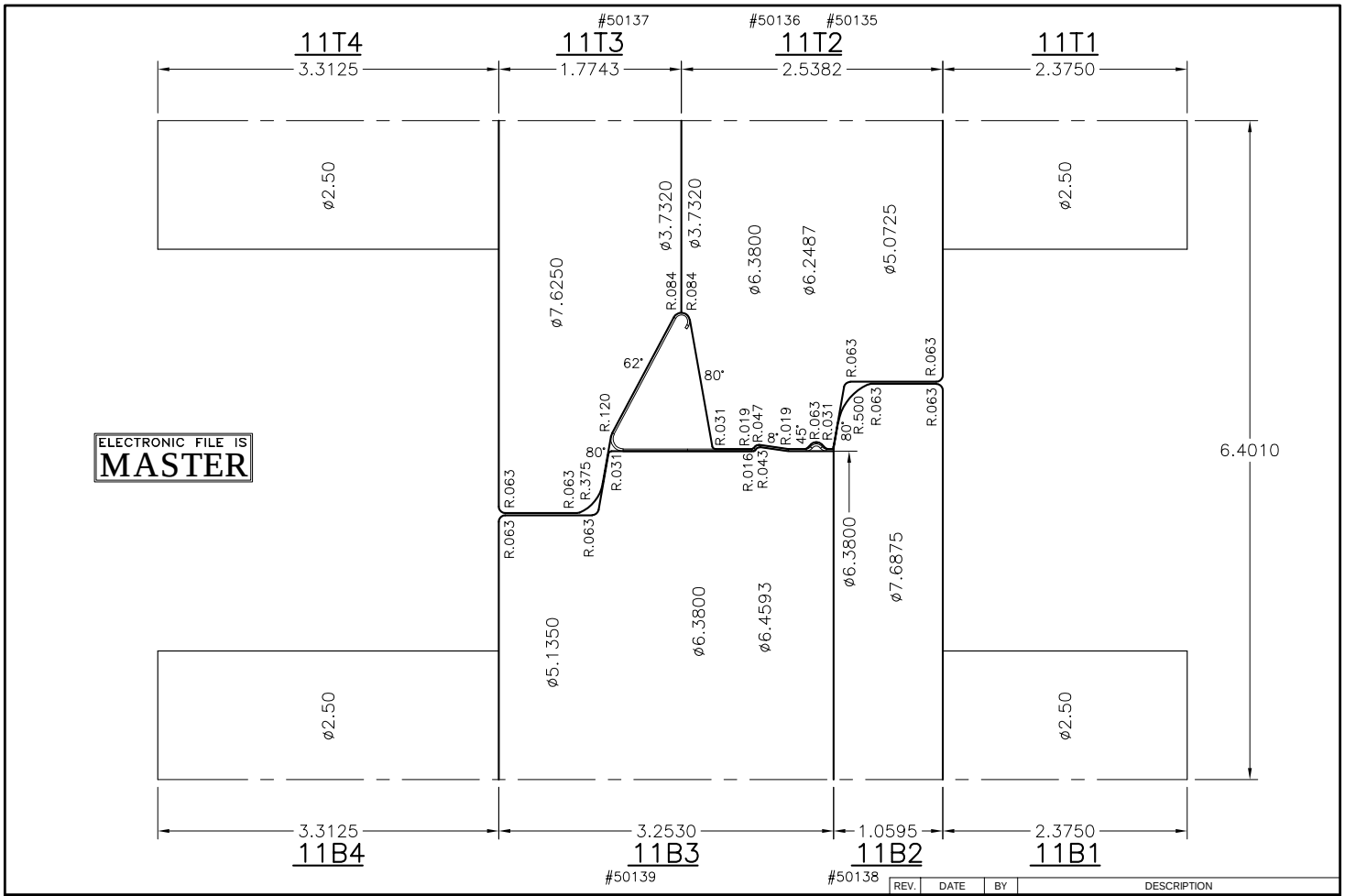
TOOLING DRAWINGS



ELECTRONIC FILE IS MASTER

REV.	DATE	BY	DESCRIPTION

CUSTOMER –	MILL TISHKEN	R.S. 10"	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE 1.5005/1.5010	MATERIAL D2	SECTION 4APN VERSION 1	
KEYWAY .260/.265 X 5/32	HARDEN Rc 59–61	ROLL MATCH .021"	

DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	11	–

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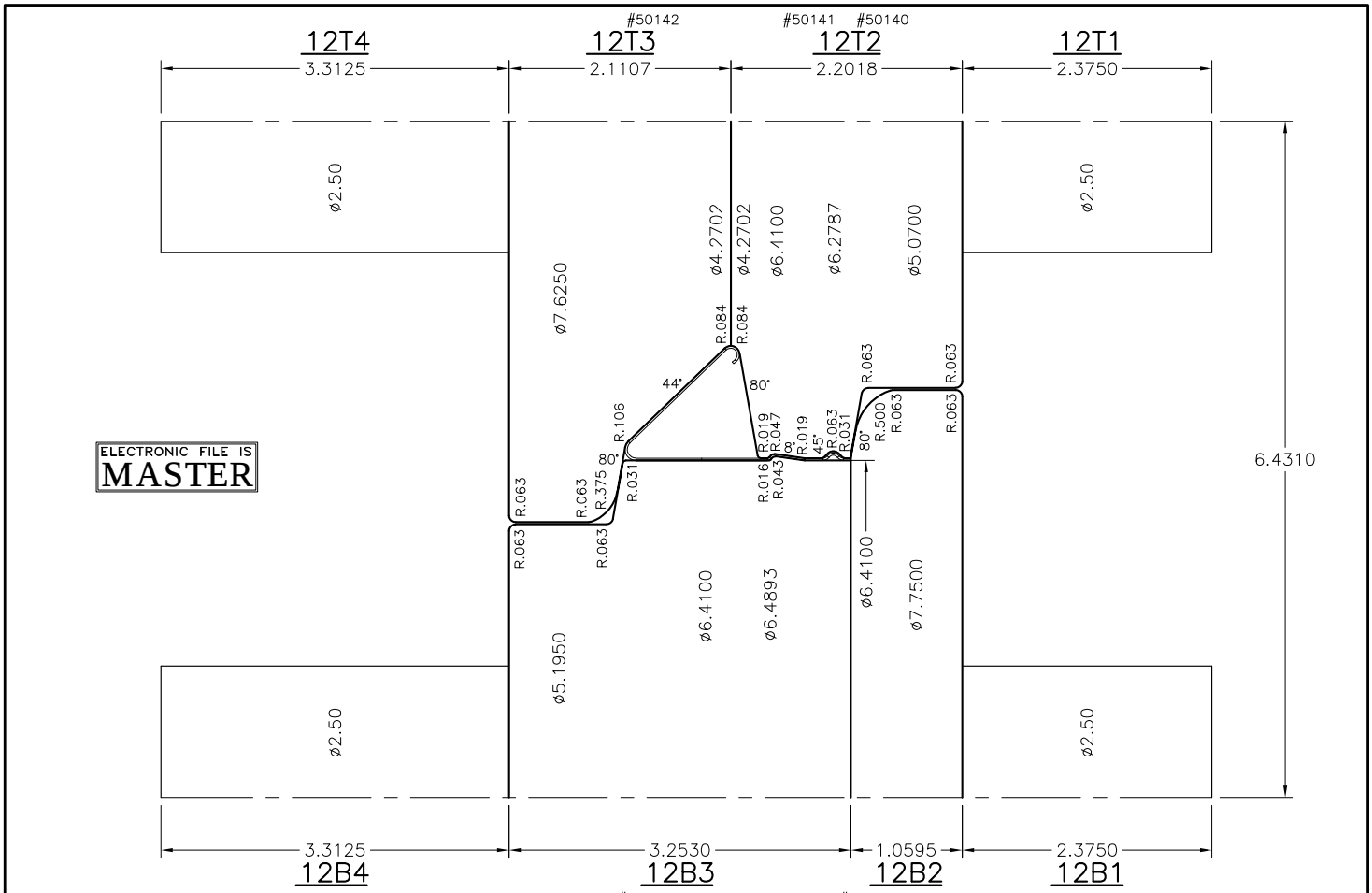
TOOLING DRAWINGS



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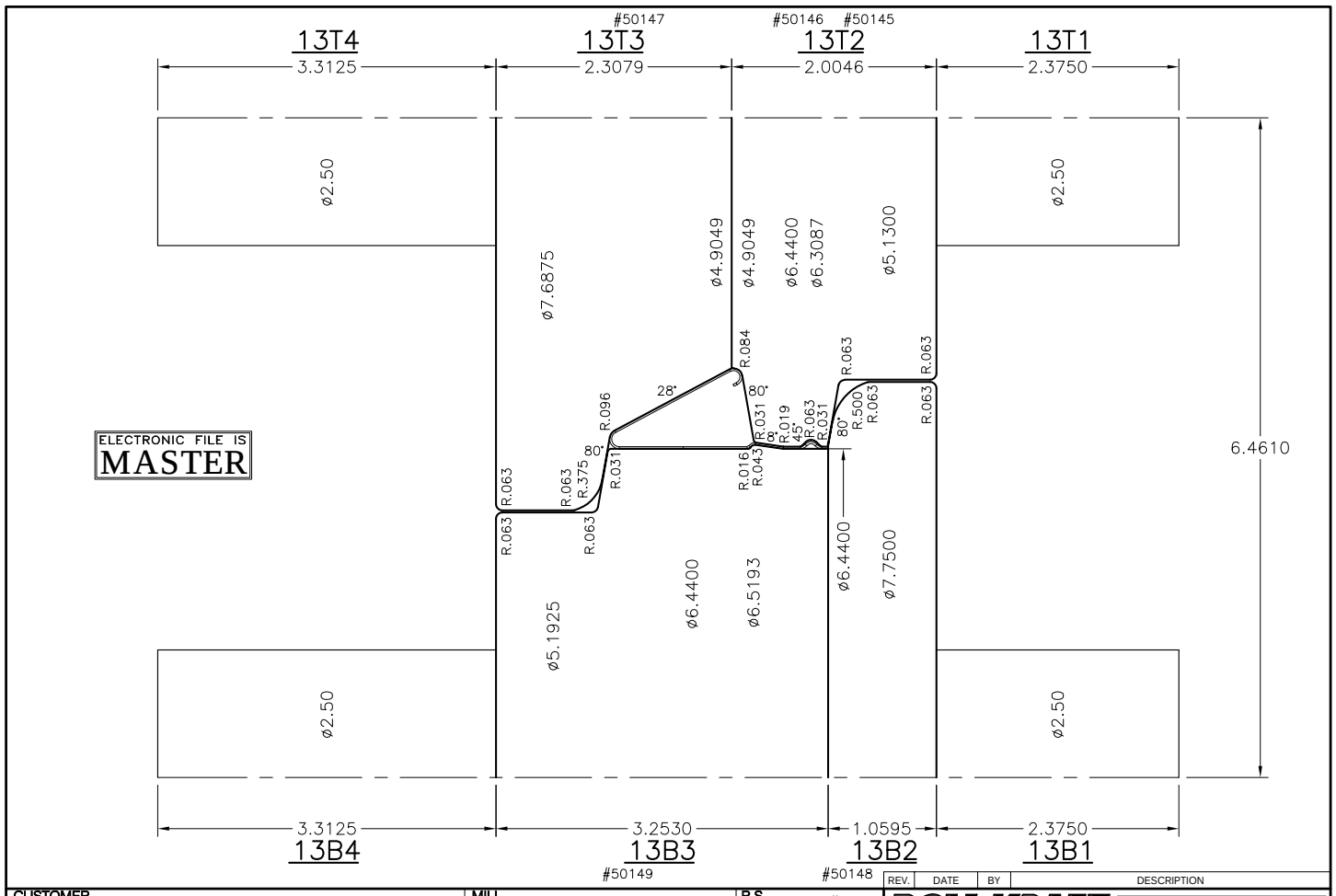
CUSTOMER –		MILL TISHKEN	R.S. 10"	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE 1.5005/1.5010	MATERIAL D2	SECTION 4APN VERSION 1		
KEYWAY .260/.265 X 5/32	HARDEN Rc 59–61	ROLL MATCH .021"		

DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	12	–

SCALE: DNS

TOOLING DRAWINGS



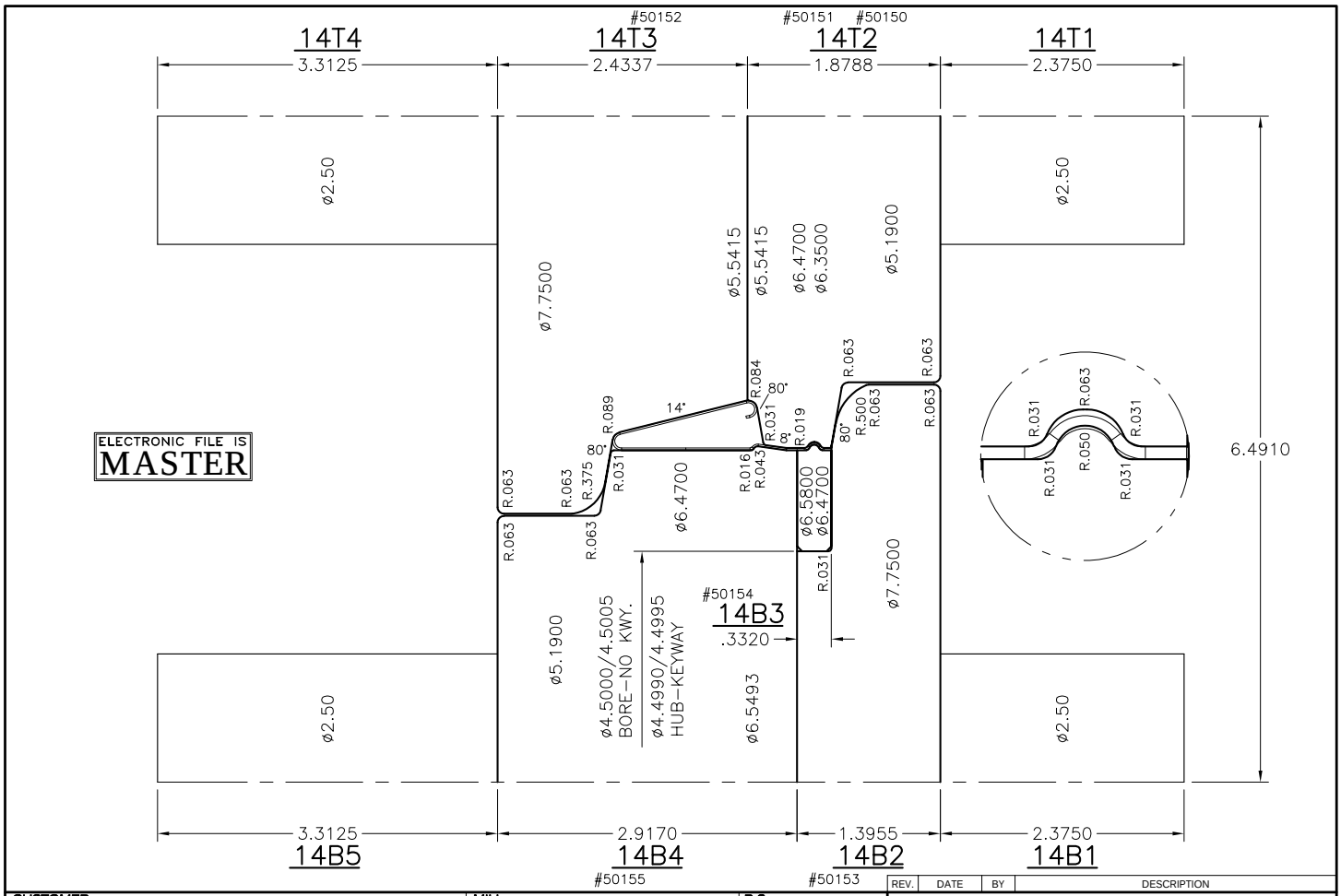
REV.	DATE	BY	DESCRIPTION

CUSTOMER: –	MILL: TISHKEN	R.S.: 10”	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 — CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE: 1.5005/1.5010	MATERIAL: D2	SECTION: 4APN VERSION 1	
KEYWAY: .260/.265 X 5/32	HARDEN: Rc 59–61	ROLL MATCH: .021”	

DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	13	–

SCALE: DNS

TOOLING DRAWINGS



ELECTRONIC FILE IS MASTER

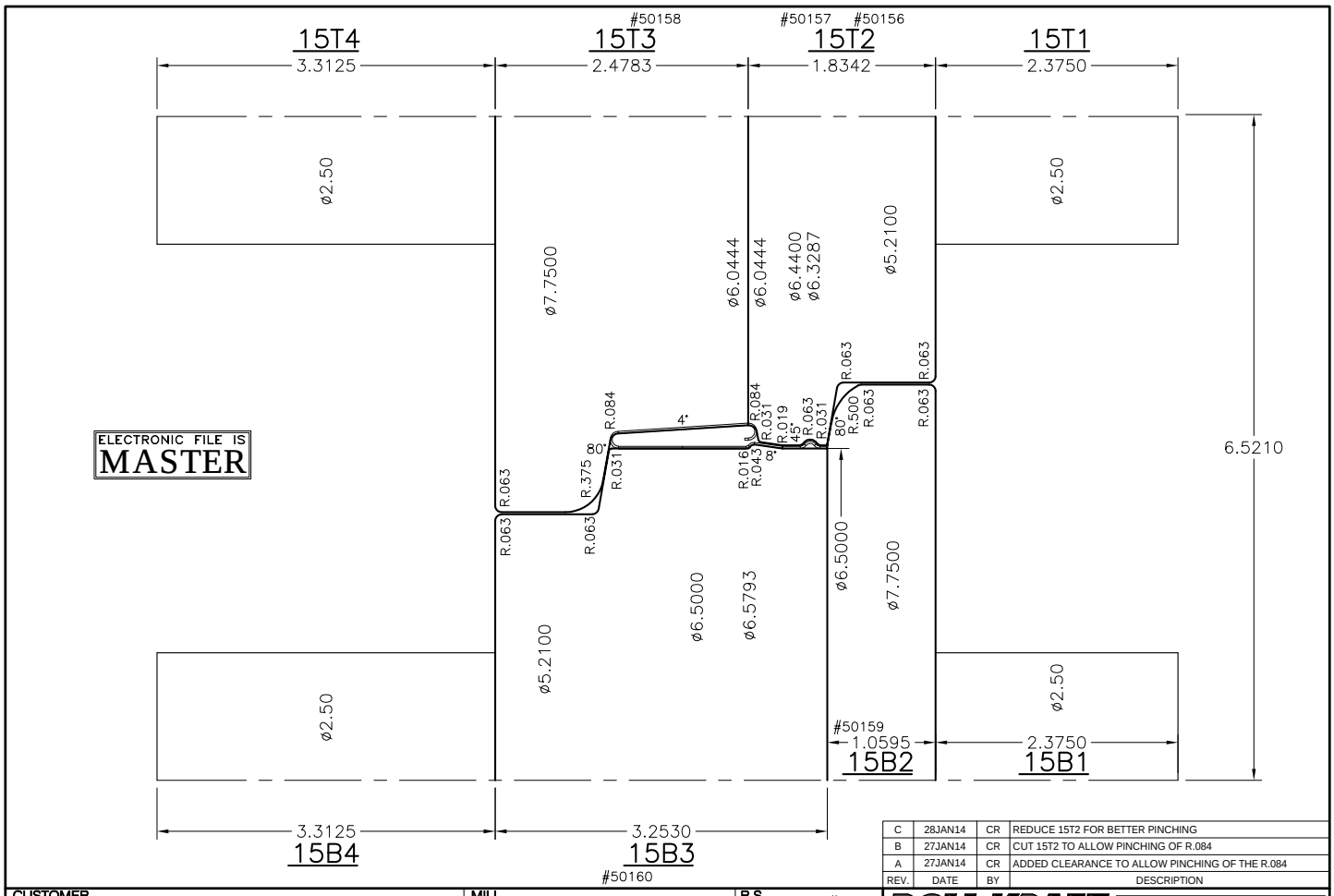
REV.	DATE	BY	DESCRIPTION

CUSTOMER: –	MILL: TISHKEN	R.S.: 10"	ROLL-KRAFT MENTOR, OHIO - (888) 953-9400 — CERTIFIED TO ISO 9001:2008 WITH DESIGN
BORE: 1.5005/1.5010	MATERIAL: D2	SECTION: 4APN VERSION 1	
KEYWAY: .260/.265 X 5/32	HARDEN: Rc 59–61	ROLL MATCH: .021"	

DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	14	–

SCALE: DNS

TOOLING DRAWINGS



REV.	DATE	BY	DESCRIPTION
C	28JAN14	CR	REDUCE 15T2 FOR BETTER PINCHING
B	27JAN14	CR	CUT 15T2 TO ALLOW PINCHING OF R.084
A	27JAN14	CR	ADDED CLEARANCE TO ALLOW PINCHING OF THE R.084

CUSTOMER	–	MILL	TISHKEN	R.S.	10"
BORE	1.5005/1.5010	MATERIAL	D2	SECTION	4APN VERSION 1
KEYWAY	.260/.265 X 5/32	HARDEN	Rc 59–61	ROLL MATCH	.021"

ROLL-KRAFT
MENTOR, OHIO - (888) 953-9400
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DATE	DES. BY	JOB NO.	PASS #	REV.
25NOV13	CL	103914–01	15	C

SCALE: DNS

TOOLING DRAWINGS