

FILENAME: C:\Program Files\TCALCW\TEST.TCA
CUSTOMER NAME: Ford Motor Company
CONTRACT or JOB Number: 1234567
PART NAME: Exhaust Sample 1
PART NUMBER: 8743-9283372
REVISION DATE: May 25, 1998
REVISION NOTE: C
BENDER TYPE: CNC100

OTHER NOTES:
Ball Flare End A

MATERIAL NAME: Carbon Steel
NOMINAL O.D. of TUBE: 3.000 in.
WALL: 0.100 in.
OFFSET 1: -0.472 in.
OFFSET 2: -0.472 in.
PRICE UNIT NAME: dollars
MATERIAL PRICE: 0.1000 dollars per Inch
LENGTH UNIT FOR PRICE CALC: Inch
TOTAL LENGTH: 87.287 in.
ELONGATION: 0.000400 deg.
CUT LENGTH: 87.117 in.
CUT LENGTH COST: 8.7117 dollars
X SPAN: 74.764 in.
Y SPAN: 15.340 in.
Z SPAN: 14.289 in.
END TO END SPAN: 75.710 in.
DISPLAY UNIT: Inches
REPORT DATE and TIME: Monday, December 30, 2002, 6:32 PM

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OFFSET 2: -0.472 in.
MC OFFSET A: 0.000 in.
MC OFFSET B: 0.000 in.
COST PER UNIT LENGTH: 0.1000 dollars
UNIT LENGTH: Inch

TOTAL LENGTH: 87.287 in.
ELONGATION: 0.000400 in. per degree
CUT LENGTH: 87.117 in.
CUT LENGTH COST: 8.7117 dollars

X SPAN: 74.764 in.
Y SPAN: 15.340 in.
Z SPAN: 14.289 in.
END TO END SPAN: 75.710 in.

BENDING SPEED: Bend Angle:90.00 deg. PER Time:1.25 Seconds
STRAIGHT DISTANCE SPEED: Straight Dis: 12.000 in. PER Time:1.00 Seconds
TOTAL BEND DEGREES IN TUBE: 426.06 deg.
TOTAL STRAIGHT DISTANCE IN TUBE: 39.926 in.
TOTAL TIME TO BEND TUBE: 9.24 Seconds

CENTERLINE XYZ COORDINATE DATA

Points	X	Y	Z	Radius
1	-1.065 in.	-7.830 in.	-7.428 in.	
2	4.000 in.	-7.830 in.	-7.428 in.	7.500 in.
3	12.353 in.	-4.165 in.	-11.548 in.	7.500 in.
4	27.647 in.	-4.862 in.	-18.124 in.	5.500 in.
5	31.257 in.	-3.864 in.	-7.243 in.	5.500 in.
6	35.096 in.	-13.550 in.	-6.935 in.	7.500 in.
7	49.623 in.	-13.550 in.	-6.840 in.	7.500 in.
8	53.404 in.	-19.204 in.	-3.835 in.	5.500 in.
9	73.699 in.	-19.204 in.	-3.835 in.	

XYZ COORDINATES (of intersection points)(in.)

BEND NO.	X	Y	Z	RADIUS
Beg.	-1.065	-7.830	-7.428	
1	4.000	-7.830	-7.428	7.500
2	12.353	-4.165	-11.548	7.500
3	27.647	-4.862	-18.124	5.500
4	31.257	-3.864	-7.243	5.500
5	35.096	-13.550	-6.935	7.500
6	49.623	-13.550	-6.840	7.500
7	53.404	-19.204	-3.835	5.500
End	73.699	-19.204	-3.835	

CENTERLINE XYZ TANGENT POINTS

Points	X	Y	Z
2A	1.748 in.	-7.830 in.	-7.428 in.
2B	5.880 in.	-7.005 in.	-8.355 in.
3A	11.019 in.	-4.750 in.	-10.890 in.
3B	13.820 in.	-4.232 in.	-12.179 in.
4A	22.128 in.	-4.610 in.	-15.751 in.
4B	29.533 in.	-4.341 in.	-12.439 in.
5A	29.637 in.	-4.312 in.	-12.126 in.
5B	33.159 in.	-8.663 in.	-7.090 in.
6A	33.220 in.	-8.816 in.	-7.086 in.
6B	40.191 in.	-13.550 in.	-6.902 in.
7A	45.357 in.	-13.550 in.	-6.868 in.
7B	51.792 in.	-16.794 in.	-5.116 in.
8A	51.808 in.	-16.817 in.	-5.104 in.
8B	56.544 in.	-19.204 in.	-3.835 in.

BENDER DATA

Bend	Length	Rotation	Angle	Radius
1	2.341 in.		33.43 deg.	7.500 in.
2	6.159 in.	-133.93 deg.	24.06 deg.	7.500 in.
3	9.052 in.	-87.95 deg.	95.10 deg.	5.500 in.
4	0.331 in.	111.90 deg.	86.39 deg.	5.500 in.
5	0.164 in.	108.65 deg.	68.38 deg.	7.500 in.
6	5.166 in.	153.88 deg.	59.26 deg.	7.500 in.
7	0.030 in.	179.62 deg.	59.44 deg.	5.500 in.
End	16.683 in.			

BENDER DATA

BEND NO.	----- TUBE LENGTH -----					ACCUM	BEND	PLANE	DIRECTION
	DBB IP-IP (in.)	BEND TP-TP (in.)	ACCUM ARC (in.)	TP-TP LEN (in.)	CL- + ARC (in.)	ANGLE BACK (in.)	ANGLE (DOB) (deg.)	of (POB) (deg.)	ROTATION
1	5.065	2.341	4.363	2.341	6.703	84.776	33.43		
2	10.009	6.159	3.139	12.862	9.298	74.254	24.06	133.93	CLOCKWISE
3	16.662	9.052	9.091	25.053	18.143	62.063	95.10	87.95	CLOCKWISE
4	11.508	0.331	8.259	34.475	8.589	52.642	86.39	111.90	COUNTER CLK
5	10.424	0.164	8.923	42.898	9.088	44.219	68.38	108.65	COUNTER CLK
6	14.527	5.166	7.734	56.988	12.900	30.129	59.26	153.88	COUNTER CLK
7	7.436	0.030	5.682	64.752	5.712	22.365	59.44	179.62	COUNTER CLK
End	20.295	16.683							

TOTAL LENGTH (w/o elongation) = 87.287 (in.)
 CUT LENGTH (with elongation) = 87.117 (in.)

NC BENDER DATA

Bend	Data for NC Bender			
	DBB	POB	DOB	Radius
1	2.341 in.		33.4 deg.	7.500 in.
2	6.159 in.	-133.9 deg.	24.1 deg.	7.500 in.
3	9.052 in.	-88.0 deg.	95.1 deg.	5.500 in.
4	0.331 in.	111.9 deg.	86.4 deg.	5.500 in.
5	0.164 in.	108.7 deg.	68.4 deg.	7.500 in.
6	5.166 in.	153.9 deg.	59.3 deg.	7.500 in.
7	0.030 in.	179.6 deg.	59.4 deg.	5.500 in.
End	16.683 in.			

CONRAC HYDRAULIC BENDER DATA

Bend Sequence	Included Length of Arc	Degree of Rotation 1	Degree of Rotation 2	Degree of Rotation 3	Bend Radius	Degree of Bend
1	84.776 in.				7.500 in.	33
2	74.254 in.	134 CW	226.07	133.93	7.500 in.	24
3	62.063 in.	88 CW	138.12	221.88	5.500 in.	95
4	52.642 in.	112 CCW	250.02	109.98	5.500 in.	86
5	44.219 in.	109 CCW	358.67	1.33	7.500 in.	68
6	30.129 in.	154 CCW	152.55	207.45	7.500 in.	59
7	22.365 in.	180 CCW	332.17	27.83	5.500 in.	59

ACCUMLATED LENGTH BENDER DATA

Distances are Inches

Bend	Add	Length	Accumulated	Rotation	Angle	Add Arc Length	Accumulated
1	2.341	2.341	0.00	33.43	4.363	6.703	7.500
2	6.159	12.862	-133.93	24.06	3.139	16.001	7.500
3	9.052	25.053	-87.95	95.10	9.091	34.144	5.500
4	0.331	34.475	111.90	86.39	8.259	42.733	5.500
5	0.164	42.898	108.65	68.38	8.923	51.821	7.500
6	5.166	56.988	153.88	59.26	7.734	64.721	7.500
7	0.030	64.752	179.62	59.44	5.682	70.434	5.500
8	16.683	87.117	0.00	0.00	0.000	87.117	0.000

8	16.683	16.683	0.00	59.44	5.682	22.365	5.500
7	0.030	22.395	179.62	59.26	7.734	30.129	7.500
6	5.166	35.295	153.88	68.38	8.923	44.219	7.500
5	0.164	44.383	108.65	86.39	8.259	52.642	5.500
4	0.331	52.973	111.90	95.10	9.091	62.063	5.500
3	9.052	71.115	-87.95	24.06	3.139	74.254	7.500
2	6.159	80.413	-133.93	33.43	4.363	84.776	7.500
1	2.341	87.117	0.00	0.00	0.000	87.117	0.000

Total Length = 87.287 Inches

Cut Length = 87.117 Inches

BENDER DATA

Bend	Length	Rotation	Angle	Tangent Distance	Arc Length	Radius
1	2.341 in.		33.43 deg.	2.252 in.	4.363 in.	7.500 in.
2	6.159 in.	-133.93 deg.	24.06 deg.	1.598 in.	3.139 in.	7.500 in.
3	9.052 in.	-87.95 deg.	95.10 deg.	6.012 in.	9.091 in.	5.500 in.
4	0.331 in.	111.90 deg.	86.39 deg.	5.164 in.	8.259 in.	5.500 in.
5	0.164 in.	108.65 deg.	68.38 deg.	5.095 in.	8.923 in.	7.500 in.
6	5.166 in.	153.88 deg.	59.26 deg.	4.266 in.	7.734 in.	7.500 in.
7	0.030 in.	179.62 deg.	59.44 deg.	3.140 in.	5.682 in.	5.500 in.
End	16.683 in.					

BENDER DATA - TANGENT DISTANCES

Bend	Distance Between Points	Prev Tangent Distance	Distance Between Bends	Next Tangent Distance
1	5.065 in.	-0.472 in.	2.341 in.	2.252 in.
2	10.009 in.	2.252 in.	6.159 in.	1.598 in.
3	16.662 in.	1.598 in.	9.052 in.	6.012 in.
4	11.508 in.	6.012 in.	0.331 in.	5.164 in.
5	10.424 in.	5.164 in.	0.164 in.	5.095 in.
6	14.527 in.	5.095 in.	5.166 in.	4.266 in.
7	7.436 in.	4.266 in.	0.030 in.	3.140 in.
End	20.295 in.	3.140 in.	16.683 in.	-0.472 in.