



PUNCH TOOL INVENTORY

OBROUNDS

0.060 X 0.125	0.140 X 2.630	0.218 X 0.350	0.312 X 0.412
0.060 X 0.250	0.150 X 0.275	0.218 X 0.500	0.312 X 0.625
0.060 X 1.000	0.150 X 0.472	0.222 X 0.972	0.312 X 0.750
0.070 X 0.250	0.150 X 0.525	0.225 X 0.325	0.323 X 0.500
0.070 X 0.270	0.150 X 0.750	0.230 X 0.360	0.340 X 1.340
0.075 X 0.160	0.150 X 0.775	0.236 X 0.596	0.344 X 0.444
0.078 X 0.125	0.150 X 1.400	0.236 X 0.630	0.350 X 0.500
0.098 X 0.177	0.150 X 1.650	0.246 X 0.325	0.375 X 0.500
0.100 X 0.250	0.156 X 0.216	0.250 X 0.330	0.375 X 1.000
0.100 X 0.300	0.156 X 0.375	0.250 X 0.375	0.400 X 0.520
0.100 X 0.520	0.156 X 0.750	0.250 X 0.406	0.406 X 0.531
0.100 X 0.700	0.157 X 0.236	0.250 X 0.437	0.406 X 1.000
0.110 X 2.500	0.160 X 1.080	0.250 X 0.453	0.406 X 1.900
0.110 X 0.250	0.162 X 0.350	0.250 X 0.500	0.410 X 0.625
0.120 X 0.475	0.175 X 0.375	0.250 X 0.750	0.437 X 1.087
0.125 X 0.225	0.175 X 0.500	0.250 X 1.000	0.500 X 1.000
0.125 X 0.250	0.177 X 0.236	0.260 X 0.360	0.531 X 1.000
0.125 X 0.500	0.180 X 0.230	0.260 X 0.400	0.531 X 1.250
0.125 X 0.750	0.180 X 0.280	0.263 X 2.450	0.625 X 1.000
0.125 X 0.875	0.187 X 0.250	0.268 X 0.406	0.670 X 1.125
0.125 X 1.000	0.187 X 0.375	0.272 X 0.522	0.670 X 1.968
0.125 X 1.125	0.187 X 0.500	0.281 X 0.375	0.750 X 1.000
0.125 X 1.188	0.187 X 1.000	0.281 X 0.406	1.000 X 1.500
0.125 X 1.375	0.187 X 1.187	0.281 X 0.500	1.000 X 2.000
0.125 X 1.625	0.189 X 1.125	0.281 X 0.750	2.300 X 3.450
0.130 X 0.190	0.200 X 0.325	0.285 X 0.512	2.500 X 3.625
0.130 X 0.375	0.200 X 0.790	0.296 X 0.410	
0.140 X 1.060	0.201 X 0.260	0.300 X 0.450	
0.140 X 1.275	0.218 X 0.315	0.300 X 0.500	

SQUARES

0.087	0.230	0.355	0.500	1.000
0.100	0.237	0.360	0.532	1.077
0.107	0.250	0.375	0.550	1.250
0.125	0.277	0.385	0.577	1.500
0.136	0.300	0.394	0.600	2.000
0.156	0.307	0.400	0.625	2.250
0.187	0.312	0.420	0.750	
0.197	0.340	0.428	0.845	

RECTANGLES

0.040 X 0.270	0.140 X 0.160	0.281 X 0.750	0.440 X 1.050
0.060 X 0.187	0.140 X 0.500	0.296 X 0.351	0.455 X 0.494
0.060 X 0.250	0.145 X 0.395	0.296 X 0.489	0.465 X 0.503
0.060 X 0.320	0.145 X 0.770	0.296 X 0.551	0.472 X 1.772
0.060 X 0.385	0.147 X 0.167	0.296 X 0.626	0.476 X 0.620
0.060 X 0.400	0.150 X 1.000	0.296 X 0.764	0.483 X 1.078
0.060 X 0.500	0.157 X 0.315	0.300 X 0.500	0.500 X 2.000
0.060 X 0.652	0.157 X 0.395	0.307 X 0.911	0.503 X 0.758
0.060 X 1.026	0.157 X 0.433	0.315 X 0.636	0.520 X 0.750
0.060 X 1.560	0.157 X 0.512	0.315 X 0.646	0.532 X 0.750
0.060 X 1.999	0.157 X 0.630	0.330 X 0.430	0.532 X 0.875
0.065 X 0.300	0.166 X 0.198	0.330 X 0.600	0.535 X 0.650
0.070 X 0.400	0.166 X 1.000	0.340 X 0.384	0.537 X 0.750
0.075 X 0.405	0.185 X 0.250	0.340 X 0.807	0.540 X 0.620
0.078 X 0.280	0.187 X 0.315	0.340 X 1.000	0.545 X 0.622
0.080 X 0.250	0.187 X 0.510	0.345 X 0.528	0.547 X 0.650
0.080 X 0.330	0.200 X 0.250	0.353 X 0.510	0.550 X 1.130
0.085 X 0.250	0.200 X 0.750	0.360 X 0.405	0.551 X 1.614
0.085 X 0.625	0.200 X 0.800	0.364 X 0.443	0.562 X 0.670
0.095 X 0.400	0.200 X 1.000	0.370 X 0.400	0.565 X 0.875
0.100 X 0.200	0.220 X 0.505	0.370 X 1.700	0.574 X 0.739
0.100 X 0.245	0.236 X 0.500	0.374 X 0.510	0.580 X 0.655
0.100 X 0.250	0.236 X 1.000	0.375 X 0.500	0.580 X 0.770
0.100 X 0.300	0.237 X 0.880	0.375 X 0.515	0.585 X 0.700
0.100 X 0.500	0.250 X 0.375	0.375 X 0.680	0.585 X 0.757
0.110 X 0.560	0.250 X 0.500	0.375 X 0.750	0.590 X 0.642
0.115 X 0.450	0.250 X 0.625	0.375 X 1.100	0.590 X 0.800
0.118 X 0.433	0.250 X 0.750	0.380 X 1.040	0.600 X 0.703
0.125 X 0.225	0.250 X 1.000	0.384 X 0.463	0.619 X 1.244
0.125 X 0.300	0.250 X 1.220	0.385 X 0.463	0.984 X 1.969
0.125 X 0.312	0.250 X 1.750	0.385 X 0.515	0.990 X 1.126
0.125 X 0.500	0.250 X 1.850	0.390 X 0.520	1.000 X 1.500
0.125 X 0.600	0.250 X 2.500	0.400 X 0.535	1.125 X 1.150
0.125 X 0.750	0.250 X 3.000	0.400 X 0.604	1.280 X 3.480
0.125 X 1.000	0.250 X 4.000	0.425 X 0.600	1.300 X 1.800
0.134 X 1.500	0.260 X 0.550	0.425 X 0.680	1.410 X 2.700
0.135 X 1.020	0.263 X 0.648	0.436 X 0.531	1.700 X 2.100
0.139 X 0.473	0.265 X 0.515	0.440 X 0.500	1.791 X 1.929
0.130 X 0.625	0.276 X 0.625	0.440 X 0.920	

HEX TOOLS

0.175	0.380
0.217	0.385
0.375	0.750

QUAD-D

0.794 X 0.900
1.610 X 1.880

DOUBLE-D

0.315 X 0.386	0.722 X 0.792
0.322 X 0.386	0.742 X 2.992
0.340 X 0.375	0.750 X 0.875
0.535 X 0.630	1.005 X 1.162
0.540 X 0.640	1.150 X 1.025
0.635 X 0.760	1.160 X 1.025
0.660 X 0.770	1.190 X 1.260

SINGLE-D

0.480 X 0.505
0.593 X 0.656
0.722 X 0.792
0.441 X 0.500

ROUNDS

0.036	0.130	0.187	0.239	0.332	0.450	0.650	0.960	1.880
0.050	0.134	0.189	0.242	0.337	0.468	0.688	1.000	1.900
0.062	0.137	0.192	0.245	0.345	0.480	0.695	1.063	2.000
0.070	0.142	0.194	0.250	0.350	0.485	0.719	1.115	2.300
0.076	0.147	0.197	0.254	0.360	0.491	0.727	1.125	2.375
0.080	0.149	0.201	0.260	0.368	0.500	0.745	1.140	2.500
0.089	0.156	0.203	0.266	0.375	0.515	0.750	1.150	2.750
0.094	0.161	0.206	0.275	0.381	0.534	0.754	1.187	2.950
0.097	0.165	0.209	0.271	0.390	0.540	0.787	1.250	3.000
0.100	0.167	0.213	0.287	0.397	0.550	0.800	1.350	3.331
0.106	0.172	0.215	0.290	0.400	0.562	0.815	1.375	3.625
0.113	0.173	0.218	0.300	0.406	0.580	0.850	1.500	4.000
0.117	0.177	0.224	0.312	0.412	0.600	0.875	1.680	4.250
0.120	0.182	0.230	0.320	0.422	0.625	0.910	1.750	4.330
0.125	0.184	0.236	0.328	0.437	0.635	0.935	1.875	4.500

CLUSTER TOOL

0.080 DIA 6 PIN 0.415 X 0.700 CTR TO CTR
0.080 DIA 25 PIN 0.219 X 0.250 CTR TO CTR
0.117 DIA 15 PIN 0.312 X 0.312 CTR TO CTR
0.140 DIA 5 PIN 0.300 X 0.300 CTR TO CTR
0.156 DIA 16 PIN 0.378 X 0.436 CTR TO CTR
0.250 DIA 12 PIN 0.500 X 0.500 CTR TO CTR
0.250 DIA 6 PIN 0.540 X 0.720 CTR TO CTR
0.390 X 0.520 REC 4 PIN 1.000 X 1.160

FOUR CORNER RADIUS

0.030 RAD X 0.310
0.062 RAD X 0.500
0.125 RAD X 0.625
0.125 TAB RAD X 0.750
0.187 RAD X 0.625
0.250 RAD X 0.750
0.375 RAD X 1.000

SERIAL PORT TOOLS

.385 X .732 10° taper w/.060 rad. corners
.400 X .730 10° taper w/.120 rad. corners
.406 X .753 10° taper w/.100 rad. corners
.450 X .780 10° taper w/.120 rad. corners
.450 X 1.113 10° taper w/ .098 rad. corners
.438 X 1.080 rec. w/.100 and .025 rad. corners

CARD GUIDES

<u>WIDTH</u>	<u>LENGTH</u>	<u>HEIGHT (OUTSIDE TO OUTSIDE)</u>	<u>FORM DIRECTION</u>
0.401	0.709	0.185	UP
0.401	0.709	0.233	UP
0.395	0.709	0.137	UP

KNOCKOUTS

ROUND

0.390 FORM UP
0.438 FORM DOWN
0.562 FORM DOWN
0.650 FORM DOWN
0.688 FORM DOWN
0.750 FORM UP
0.750 FORM DOWN
0.875 FORM DOWN
0.875 FORM UP
0.875IN1.125OUT FORM UP DOUBLE
1.000 FORM UP
1.063 FORM DOWN
1.115 FORM DOWN
1.156 FORM DOWN
1.250 FORM DOWN
1.250 FORM UP
1.375 FORM DOWN
1.375 FORM UP
1.500 FORM UP
1.750 FORM DOWN
1.900 FORM DOWN
2.000 FORM DOWN
2.000 FORM UP
2.375 FORM UP
2.375 FORM DOWN
2.500 FORM DOWN
2.500 FORM UP
2.750 FORM UP
3.000 FORM DOWN
3.250 FORM DOWN
3.500 FORM DOWN
4.125 FORM DOWN

RECTANGLE

0.500 X 0.625 FORM UP
0.580 X 0.760 FORM UP
0.984 X 1.969 FORM DOWN

SQUARE

0.400 FORM DOWN

OBROUND

0.420 X 1.045 FORM UP
0.425 X 0.625 FORM DOWN

QUAD-D

0.791 X 0.886 FORM DOWN

DOUBLE-D

0.640 X 0.760 FORM DOWN
0.640 X 0.760 FORM UP

SINGLE-D

0.580 X 0.635 FORM UP
0.593 X 0.656 FORM DOWN

LOUVERS FORM UP

<u>LENGTH</u>	<u>WIDTH</u>	<u>HEIGHT</u>	<u>MINIMUM SPACING</u>
3.000	0.800	0.315 TOP TO TOP	1.125 X 4.000
4.000	0.750	0.370 TOP TO TOP	1.125 X 4.500
4.133	0.590	0.250 TOP TO TOP	0.900 X 4.448

HALFSHEARS

ROUND

0.125 FORM DOWN
0.125 FORM UP
0.155 FORM UP
0.170 FORM UP
0.205 FORM UP
0.250 FORM UP
0.250 FORM DOWN
0.281 FORM UP
0.281 FORM DOWN
0.313 FORM UP

0.313 FORM DOWN
0.500 FORM UP
0.500 FORM DOWN
0.625 FORM UP
0.625 FORM DOWN

OBROUND

0.700 X 0.825 FORM UP

SQUARE

0.250 FORM DOWN

CURVED RECTANGLES

0.250IN. RAD. 90°
0.060IN. RAD. 45°
0.090IN. RAD. 90°
0.125IN. RAD. 90° .125 GAP
0.250IN. RAD. 90°
0.500IN. RAD. 90° .125 GAP
1.225IN. RAD. 25.0702°
1.250IN. RAD. 12.25°

1.000IN. RAD. 90° .125 GAP
2.950IN. RAD. 18.21°
0.500IN. RAD. 90° .095 GAP
2.805IN. RAD. 12.316°
2.875IN. RAD. 8°
0.375IN. RAD. 90° .200 GAP
2.270IN. RAD. 60° .125 GAP

CURVED OBROUNDS

1.468IN. RAD. 25° .265 GAP

GROUND SYMBOLS

TOP GROUND SYMBOL W/O RING
TOP GROUND SYMBOL WITH RING
BOTTOM GROUND SYMBOL W/O RING
BOTTOM GROUND SYMBOL WITH RING

CENTER PUNCHES

TOP CENTER PUNCH

BOTTOM CENTER PUNCH

PART MARK TOOLS

TOP PART MARK 2-ROW 10 SPACES PER ROW 1.250IN. STATION
BOTTOM PART MARK 2-ROW 10 SPACES PER ROW 1.250IN. STATION
TOP PART MARK 2-ROW 12 SPACES PER ROW 2.000IN. STATION
BOTTOM PART MARK 2-ROW 15 SPACES PER ROW 2.000IN. STATION
TOP PART MARK 2 ROWS AT 22 SPACES AND 2 ROWS AT 14 SPACES

COUNTER BORES

0.203 FORM DOWN
0.250 FORM DOWN
0.270 FORM UP

TOP COUNTERSINKS

MAT.	MAT.	MAT.
60° .470 through .594 .125	82° .222 through .275 .035	100° .129 through .233 .048
82° .095 through .150 .040	82° .249 through .405 .090	100° .130 through .234 .048
82° .095 through .178 .060	82° .250 through .345 .060	100° .140 through .260 .040
82° .096 through .210 .090	82° .255 through .385 .075	100° .142 through .235 .060
82° .100 through .161 .050	82° .265 through .388 .074	100° .150 through .260 .060
82° .110 through .207 .060	82° .272 through .419 .089	100° .150 through .281 .080
82° .118 through .250 .080	82° .297 through .507 .125	100° .160 through .293 .060
82° .130 through .253 .075	82° .312 through .375 .119	100° .189 through .350 .074
82° .132 through .177 .048	82° .313 through .425 .125	100° .198 through .430 .090
82° .140 through .238 .074	82° .358 through .507 .090	100° .201 through .406 .090
82° .150 through .225 .048	90° .081 through .153 .040	100° .205 through .382 .090
82° .150 through .295 .125	90° .110 through .207 .100	100° .217 through .350 .060
82° .150 through .310 .105	90° .115 through .227 .060	100° .250 through .455 .090
82° .156 through .250 .060	90° .132 through .177 .048	100° .255 through .495 .125
82° .165 through .322 .105	90° .140 through .253 .074	100° .266 through .529 .125
82° .166 through .292 .074	90° .170 through .280 .060	100° .281 through .460 .090
82° .170 through .335 .105	90° .177 through .296 .080	100° .293 through .510 .125
82° .177 through .342 .125	90° .189 through .380 .119	100° .325 through .507 .125
82° .178 through .281 .060	90° .195 through .283 .048	120° .130 through .237 .035
82° .180 through .303 .075	90° .210 through .382 .080	120° .130 through .240 .035
82° .187 through .350 .090	90° .240 through .419 .090	120° .130 through .275 .080
82° .190 through .311 .119	90° .260 through .500 .125	120° .162 through .348 .090
82° .196 through .305 .135	90° .265 through .377 .060	120° .191 through .400 .090
82° .200 through .410 .125	92° .128 through .225 .048	120° .197 through .445 .090
82° .207 through .410 .125	92° .167 through .302 .100	
82° .220 through .390 .119	100° .070 through .130 .040	

BOTTOM COUNTERSINKS

	MAT.		MAT.
82° .156 through .240	.060	100° .142 through .235	.060
82° .150 through .315	.105	100° .130 through .230	.040
82° .156 through .250	.060	100° .167 through .290	.074
82° .178 through .281	.060	100° .213 through .322	.060
82° .125 through .220	.040	120° .130 through .233	.060
82° .170 through .370	.090	120° .135 through .250	.080
90° .130 through .242	.060	120° .191 through .400	.125
90° .260 through .370	.060		

EMBOSESSES

ROUND

0.280	0.150	0.100	DOWN
0.524	0.250	0.112	UP
0.524	0.250	0.112	DOWN
0.620	0.502	0.031	UP
0.625	0.425	0.090	DOWN
0.664	0.422	0.134	DOWN
0.922	0.484	0.060	UP
0.956	0.506	0.225	DOWN
0.956	0.506	0.240	UP
1.000	0.375	0.110	DOWN
1.000	0.504	0.100	UP
1.375	1.000	0.200	DOWN
1.225	0.683	0.200	UP
1.413	1.250	0.150	UP
1.413	1.250	0.150	DOWN
1.595	1.350	0.120	UP
1.900	1.750	0.075	DOWN
2.500	1.926	0.250	UP

RECTANGLE

1.350 X 1.850	1.100 X 1.600	0.070	UP
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OBROUND

1.375 X 1.875	.750 X 1.250	0.190	DOWN
0.060 X 0.250		0.030	DOWN

RIB TOOLS

<u>WIDTH</u>	<u>HEIGHT</u>	<u>MAX MATERIAL</u>
0.200	0.040	0.060
0.200	0.090	0.060
0.220	0.100	0.060
0.541	0.182	0.105

HINGE TOOLS

18ga/.050 hinge tool 1/2in. wide knuckle w/ .125 pin

16ga/.060 hinge tool 1/2in. wide knuckle w/ .125 pin

14ga/.080 hinge tool 1/2in. wide knuckle w/ .156 pin

BRIDGE LANCES

<u>WIDTH</u>	<u>LENGTH</u>	<u>HEIGHT (OUTSIDE TO OUTSIDE)</u>	<u>FORM DIRECTION</u>
0.065	0.300	0.120	UP
0.105	0.816	0.200	UP
0.125	0.900	0.355	UP
0.150	0.039	0.160	UP
0.150	0.900	0.290	UP
0.200	1.000	0.260	UP
0.200	0.650	0.185	UP
0.200	0.600	0.158	DOWN
0.450	1.000	0.315	UP

ROLLING OFFSET TOOLS

0.060 material capacity rolling offset tool

EXTRUSIONS

.048 material .089 thru .075 height out to out

.060 material .136 thru .128 height out to out

.060 material .147 thru .125 height out to out

.080 material .120 thru .143 height out to out

DIMPLES

Form up .130 inside dia. .060 material cap. .060 top to top