

## **Capítulo IV**

### **4 Generación de Códigos G/M de Piezas**

#### **4.1 Concepto y generalidades de los códigos G/M**

La generación de códigos G/M, es el paso siguiente de la manufactura en el programa Camworks. Esta acción viene después de la simulación de las rutas de maquinado, una vez que se aseguró de que el resultado será el deseado.

Los códigos G/M obtenidos en estas piezas fueron bastante extensos es por esto que se mostrarán de manera representativa sólo algunas líneas de cada código, las primeras y las ultimas.

Todos los códigos G/M fueron simulados con el programa CIMCO para corroborar que no existiera ningún error en ellos. El programa CIMCO es utilizado solamente para la visualización del código generado por algún software.

#### **4.2 Generación de Códigos**

##### **4.2.1 Parte Superior de Articulación**

El código que se generó de esta pieza fue el más extenso de todos, fueron 15598 líneas. El código G/M se muestra a continuación así como la figura de la pieza en isométrico.

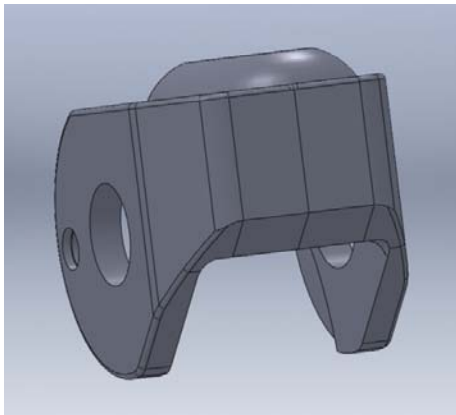


Figura 126. Imagen isométrica de Pieza Superior de Articulación.

O0001  
N1 G20  
N2 (1" 4 FLUTE HSS EM)  
N3 G91 G28 X0 Y0 Z0  
N4 T1 M06  
N5 S2000 M03  
N6 G90 G54 G00 X1.2238 Y-.8648  
N7 G43 Z1.2163 H1 M08  
N8 G01 Z.2163 F4.  
N9 G17 X1.2186 Y-.8655 Z.1895  
N10 X1.2035 Y-.8674 Z.1668  
N11 X1.181 Y-.8702 Z.1516  
N12 X1.1544 Y-.8736 Z.1463  
N13 X1.1219 Y-.8836 Z.1451  
N14 X1.0945 Y-.9039 Z.1439  
N15 X1.0756 Y-.9321 Z.1427  
N16 X1.0673 Y-.9651 Z.1415  
N17 X1.0705 Y-.999 Z.1403  
N18 X1.0848 Y-1.0298 Z.1391  
N19 X1.1087 Y-1.0541 Z.1379  
N20 X1.1393 Y-1.0689 Z.1367  
N21 X1.1731 Y-1.0726 Z.1355  
N22 X1.2063 Y-1.0648 Z.1344  
N23 X1.2348 Y-1.0463 Z.1332  
N24 X1.2555 Y-1.0193 Z.132  
N25 X1.266 Y-.9869 Z.1308  
N26 X1.265 Y-.9529 Z.1296  
N27 X1.2526 Y-.9212 Z.1284  
N28 X1.2303 Y-.8954 Z.1272  
N29 X1.2007 Y-.8787 Z.126  
N30 X1.1672 Y-.8728 Z.1248  
N31 X1.1336 Y-.8785 Z.1236  
N32 X1.104 Y-.8952 Z.1224  
N33 X1.0816 Y-.9208 Z.1213  
N34 X1.0691 Y-.9524 Z.1201  
N35 X1.0679 Y-.9864 Z.1189  
N36 X1.0782 Y-1.0189 Z.1177  
N37 X1.0988 Y-1.046 Z.1165  
N38 X1.1273 Y-1.0646 Z.1153  
N39 X1.1603 Y-1.0726 Z.1141  
N40 X1.1942 Y-1.069 Z.1129  
N41 X1.2249 Y-1.0543 Z.1117  
N42 X1.2489 Y-1.0302 Z.1105  
N43 X1.2634 Y-.9994 Z.1094  
N44 X1.2667 Y-.9656 Z.1082  
N45 X1.2585 Y-.9325 Z.107  
N46 X1.2397 Y-.9042 Z.1058

N94 X1.1561 Y-1.0722 Z.0486  
N95 X1.19 Y-1.0701 Z.0474  
N96 X1.2213 Y-1.0567 Z.0463  
N97 X1.2463 Y-1.0337 Z.0451  
N98 X1.2621 Y-1.0035 Z.0439  
N99 X1.2669 Y-.9698 Z.0427  
N100 X1.2601 Y-.9365 Z.0415  
N101 X1.2426 Y-.9073 Z.0403  
N102 X1.2162 Y-.8858 Z.0391  
N103 X1.1842 Y-.8743 Z.0379  
N104 X1.1502 Y-.8742 Z.0367  
N105 X1.1181 Y-.8856 Z.0355  
N106 X1.0917 Y-.907 Z.0344  
N107 X1.074 Y-.9361 Z.0332  
N108 X1.067 Y-.9694 Z.032  
N109 X1.0717 Y-1.0031 Z.0308  
N110 X1.0873 Y-1.0333 Z.0296  
N111 X1.1122 Y-1.0565 Z.0284  
N112 X1.1435 Y-1.07 Z.0272  
N113 X1.1774 Y-1.0723 Z.026  
N114 X1.2102 Y-1.063 Z.0248  
N115 X1.2379 Y-1.0433 Z.0236  
N116 X1.2574 Y-1.0154 Z.0224  
N117 X1.2665 Y-.9826 Z.0213  
N118 X1.264 Y-.9487 Z.0201  
N119 X1.2503 Y-.9176 Z.0189  
N120 X1.227 Y-.8928 Z.0177  
N121 X1.1967 Y-.8773 Z.0165  
N122 X1.1629 Y-.8729 Z.0153  
N123 X1.1296 Y-.88 Z.0141  
N124 X1.1007 Y-.8979 Z.0129  
N125 X1.0794 Y-.9245 Z.0117  
N126 X1.0683 Y-.9566 Z.0105  
N127 X1.0686 Y-.9907 Z.0094  
N128 X1.0803 Y-1.0226 Z.0082  
N129 X1.102 Y-1.0488 Z.007  
N130 X1.1312 Y-1.0662 Z.0058  
N131 X1.1646 Y-1.0728 Z.0046  
N132 X1.1983 Y-1.0678 Z.0034  
N133 X1.2283 Y-1.0518 Z.0022  
N134 X1.2512 Y-1.0267 Z.001  
N135 X1.2644 Y-.9953 Z-.0002  
N136 X1.2663 Y-.9613 Z-.0014  
N137 X1.2567 Y-.9287 Z-.0026  
N138 X1.2367 Y-.9011 Z-.0037  
N139 X1.2086 Y-.8819 Z-.0049  
N140 X1.1757 Y-.8732 Z-.0061

N47 X1.2125 Y-.8838 Z.1046  
N48 X1.18 Y-.8737 Z.1034  
N49 X1.146 Y-.875 Z.1022  
N50 X1.1144 Y-.8877 Z.101  
N51 X1.0889 Y-.9103 Z.0998  
N52 X1.0725 Y-.9401 Z.0986  
N53 X1.067 Y-.9737 Z.0974  
N54 X1.073 Y-1.0071 Z.0963  
N55 X1.09 Y-1.0366 Z.0951  
N56 X1.1158 Y-1.0588 Z.0939  
N57 X1.1476 Y-1.0709 Z.0927  
N58 X1.1816 Y-1.0717 Z.0915  
N59 X1.214 Y-1.0611 Z.0903  
N60 X1.2408 Y-1.0402 Z.0891  
N61 X1.2592 Y-1.0115 Z.0879  
N62 X1.2668 Y-.9784 Z.0867  
N63 X1.2629 Y-.9446 Z.0855  
N64 X1.2479 Y-.914 Z.0844  
N65 X1.2235 Y-.8903 Z.0832  
N66 X1.1925 Y-.8761 Z.082  
N67 X1.1587 Y-.8732 Z.0808  
N68 X1.1257 Y-.8817 Z.0796  
N69 X1.0976 Y-.9008 Z.0784  
N70 X1.0774 Y-.9283 Z.0772  
N71 X1.0677 Y-.9609 Z.076  
N72 X1.0694 Y-.9948 Z.0748  
N73 X1.0825 Y-1.0263 Z.0736  
N74 X1.1053 Y-1.0515 Z.0724  
N75 X1.1352 Y-1.0676 Z.0713  
N76 X1.1689 Y-1.0728 Z.0701  
N77 X1.2023 Y-1.0664 Z.0689  
N78 X1.2316 Y-1.0491 Z.0677  
N79 X1.2535 Y-1.023 Z.0665  
N80 X1.2653 Y-.9911 Z.0653  
N81 X1.2657 Y-.9571 Z.0641  
N82 X1.2547 Y-.9249 Z.0629  
N83 X1.2336 Y-.8982 Z.0617  
N84 X1.2047 Y-.8802 Z.0605  
N85 X1.1715 Y-.8729 Z.0594  
N86 X1.1377 Y-.8772 Z.0582  
N87 X1.1073 Y-.8925 Z.057  
N88 X1.0839 Y-.9172 Z.0558  
N89 X1.07 Y-.9483 Z.0546  
N90 X1.0674 Y-.9822 Z.0534  
N91 X1.0763 Y-1.015 Z.0522  
N92 X1.0957 Y-1.043 Z.051  
N93 X1.1234 Y-1.0628 Z.0498

N141 X1.1418 Y-.876 Z-.0073  
N142 X1.1108 Y-.8901 Z-.0085  
N143 X1.0863 Y-.9137 Z-.0097  
N144 X1.0712 Y-.9441 Z-.0109  
N145 X1.0671 Y-.9779 Z-.0121  
N146 X1.0746 Y-1.0111 Z-.0133  
N147 X1.0928 Y-1.0399 Z-.0145  
N148 X1.1196 Y-1.0609 Z-.0156  
N149 X1.1518 Y-1.0717 Z-.0168  
N150 X1.1859 Y-1.071 Z-.018  
N151 X1.2177 Y-1.059 Z-.0192  
N152 X1.2437 Y-1.037 Z-.0204  
N153 X1.2607 Y-1.0076 Z-.0216  
N154 X1.267 Y-.9741 Z-.0228  
N155 X1.2616 Y-.9405 Z-.024  
N156 X1.2453 Y-.9106 Z-.0252  
N157 X1.2199 Y-.888 Z-.0264  
N158 X1.1884 Y-.8751 Z-.0276  
N159 X1.1544 Y-.8736 Z-.0287  
N160 X1.1219 Y-.8836 Z-.0299  
N161 X1.0945 Y-.9039 Z-.0311  
N162 X1.0756 Y-.9321 Z-.0323  
N163 X1.0673 Y-.9651 Z-.0335  
N164 X1.0705 Y-.999 Z-.0347  
N165 X1.0848 Y-1.0298 Z-.0359  
N166 X1.1087 Y-1.0541 Z-.0371  
N167 X1.1393 Y-1.0689 Z-.0383  
N168 X1.1731 Y-1.0726 Z-.0395  
N169 X1.2063 Y-1.0648 Z-.0406  
N170 X1.2348 Y-1.0463 Z-.0418  
N171 X1.2555 Y-1.0193 Z-.043  
N172 X1.266 Y-.9869 Z-.0442  
N173 X1.265 Y-.9529 Z-.0454  
N174 X1.2526 Y-.9212 Z-.0466  
N175 X1.2303 Y-.8954 Z-.0478  
N176 X1.2007 Y-.8787 Z-.049  
N177 X1.1672 Y-.8728 Z-.0502  
N178 X1.1336 Y-.8785 Z-.0514  
N179 X1.104 Y-.8952 Z-.0526  
N180 X1.0816 Y-.9208 Z-.0537  
N181 X1.0691 Y-.9524 Z-.0549  
N182 X1.0679 Y-.9864 Z-.0561  
N15594 Z.176  
N15595 G00 Z2. M09  
N15596 G91 G28 Z0  
N15597 G28 X0 Y0  
N15598 M30

#### 4.2.2 Adaptador de Encaje

El código del Adaptador de Encaje fue de 5664 líneas, a continuación se muestran algunas de ellas de manera representativa.



Figura 127. Imagen isométrica de Adaptador de Encaje.

O0002	N110 X3.5924 Y.9195 Z-.0306
N1 G20	N111 X3.5568 Y.9372 Z-.032
N2 (1" 4 FLUTE HSS EM)	N112 X3.5172 Y.9395 Z-.0334
N3 G91 G28 X0 Y0 Z0	N113 X3.4797 Y.9262 Z-.0347
N4 T01 H01 M06	N114 X3.4504 Y.8994 Z-.0361
N5 S4500 M03	N115 X3.4338 Y.8634 Z-.0375
N6 G90 G54 G00 X3.5772 Y.7274	N116 X3.4326 Y.8237 Z-.0388
N7 Z1.173	N117 X3.4469 Y.7866 Z-.0402
N8 G01 Z.173 F8.	N118 X3.4746 Y.7581 Z-.0415
N9 G17 X3.5801 Y.7319 Z.1462	N119 X3.5111 Y.7425 Z-.0429
N10 X3.5883 Y.7447 Z.1235	N120 X3.5508 Y.7424 Z-.0443
N11 X3.6007 Y.7637 Z.1083	N121 X3.5874 Y.7578 Z-.0456
N12 X3.6152 Y.7862 Z.103	N122 X3.6152 Y.7862 Z-.047
N13 X3.6297 Y.8232 Z.1016	N123 X3.616 Y.7889 F20.
N14 X3.6286 Y.8629 Z.1003	N124 Y1.2111
N15 X3.6122 Y.8991 Z.0989	N125 X3.6111 Y1.216
N16 X3.583 Y.926 Z.0975	N126 X3.484
N17 X3.5456 Y.9394 Z.0962	N127 X3.4791 Y1.2111
N18 X3.506 Y.9373 Z.0948	N128 Y1.
N19 X3.4703 Y.9198 Z.0935	N129 Y.7889
N20 X3.4442 Y.8899 Z.0921	N130 X3.484 Y.784
N21 X3.4319 Y.8521 Z.0907	N131 X3.6111
N22 X3.4352 Y.8125 Z.0894	N132 X3.6152 Y.7862
N23 X3.4536 Y.7774 Z.088	N133 X3.617 Y.7889
N24 X3.4843 Y.7522 Z.0866	N134 X3.7041 Y.9065
N25 X3.5224 Y.7409 Z.0853	N135 X3.7115 Y.9206
N26 X3.5619 Y.7453 Z.0839	N136 X3.714 Y.9362

N27 X3.5965 Y.7648 Z.0825  
N28 X3.6208 Y.7962 Z.0812  
N29 X3.631 Y.8346 Z.0798  
N30 X3.6254 Y.8739 Z.0785  
N31 X3.605 Y.9079 Z.0771  
N32 X3.5729 Y.9314 Z.0757  
N33 X3.5343 Y.9404 Z.0744  
N34 X3.4951 Y.9338 Z.073  
N35 X3.4617 Y.9124 Z.0716  
N36 X3.4392 Y.8796 Z.0703  
N37 X3.4312 Y.8407 Z.0689  
N38 X3.439 Y.8018 Z.0675  
N39 X3.4613 Y.7689 Z.0662  
N40 X3.4947 Y.7474 Z.0648  
N41 X3.5338 Y.7405 Z.0635  
N42 X3.5725 Y.7494 Z.0621  
N43 X3.6047 Y.7727 Z.0607  
N44 X3.6253 Y.8067 Z.0594  
N45 X3.631 Y.846 Z.058  
N46 X3.621 Y.8844 Z.0566  
N47 X3.5968 Y.9159 Z.0553  
N48 X3.5623 Y.9355 Z.0539  
N49 X3.5228 Y.9401 Z.0525  
N50 X3.4847 Y.929 Z.0512  
N51 X3.4539 Y.904 Z.0498  
N52 X3.4353 Y.8689 Z.0485  
N53 X3.4318 Y.8293 Z.0471  
N54 X3.444 Y.7915 Z.0457  
N55 X3.4699 Y.7614 Z.0444  
N56 X3.5056 Y.7438 Z.043  
N57 X3.5452 Y.7415 Z.0416  
N58 X3.5826 Y.7547 Z.0403  
N59 X3.612 Y.7815 Z.0389  
N60 X3.6285 Y.8176 Z.0375  
N61 X3.6298 Y.8573 Z.0362  
N62 X3.6154 Y.8944 Z.0348  
N63 X3.5878 Y.9229 Z.0335  
N64 X3.5513 Y.9385 Z.0321  
N65 X3.5115 Z.0307  
N66 X3.4749 Y.9232 Z.0294  
N67 X3.4472 Y.8947 Z.028  
N68 X3.4327 Y.8578 Z.0266  
N69 X3.4337 Y.8181 Z.0253  
N70 X3.4502 Y.7819 Z.0239  
N71 X3.4794 Y.755 Z.0225  
N72 X3.5167 Y.7415 Z.0212  
N73 X3.5564 Y.7437 Z.0198  
N74 X3.5921 Y.7612 Z.0185  
N75 X3.6182 Y.7911 Z.0171  
N76 X3.6305 Y.8289 Z.0157  
N137 Y1.3091  
N138 X3.7091 Y1.314  
N139 X3.386  
N140 X3.3811 Y1.3091  
N141 Y1.  
N142 Y.6909  
N143 X3.386 Y.686  
N144 X3.7091  
N145 X3.714 Y.6909  
N146 Y.9362  
N147 X3.7171 Y.9538  
N148 X3.7263 Y.9691  
N149 X3.7997 Y1.0534  
N150 X3.8088 Y1.0687  
N151 X3.812 Y1.0862  
N152 Y1.4071  
N153 X3.8071 Y1.412  
N154 X3.288  
N155 X3.2831 Y1.4071  
N156 Y1.  
N157 Y.5929  
N158 X3.288 Y.588  
N159 X3.8071  
N160 X3.812 Y.5929  
N161 Y1.0862  
N162 X3.8151 Y1.1038  
N163 X3.8243 Y1.1191  
N164 X3.8977 Y1.2034  
N165 X3.9068 Y1.2187  
N166 X3.91 Y1.2362  
N167 Y1.5052  
N168 X3.9052 Y1.51  
N169 X3.1899  
N170 X3.1851 Y1.5052  
N171 Y1.  
N172 Y.4948  
N173 X3.1899 Y.49  
N174 X3.9052  
N175 X3.91 Y.4948  
N176 Y1.2362  
N177 X3.9132 Y1.2538  
N178 X3.9223 Y1.2691  
N179 X3.9957 Y1.3534  
N180 X4.0048 Y1.3687  
N181 X4.008 Y1.3862  
N182 Y1.6032  
N183 X4.0032 Y1.608  
N184 X3.0919  
N185 X3.0871 Y1.6032  
N186 Y1.

N77 X3.6272 Y.8685 Z.0144	N187 Y.3968
N78 X3.6087 Y.9036 Z.013	N188 X3.0919 Y.392
N79 X3.578 Y.9288 Z.0116	N189 X4.0032
N80 X3.54 Y.9401 Z.0103	N190 X4.008 Y.3968
N81 X3.5005 Y.9357 Z.0089	N191 Y1.3862
N82 X3.4659 Y.9162 Z.0075	N192 X4.0112 Y1.4038
N83 X3.4415 Y.8848 Z.0062	N193 X4.0203 Y1.4191
N84 X3.4314 Y.8464 Z.0048	N194 X4.0937 Y1.5034
N85 X3.4369 Y.8071 Z.0035	N195 X4.1028 Y1.5187
N86 X3.4574 Y.773 Z.0021	N196 X4.106 Y1.5362
N87 X3.4894 Y.7496 Z.0007	N197 Y1.7012
N88 X3.5281 Y.7405 Z-.0006	N198 X4.1012 Y1.706
N89 X3.5673 Y.7472 Z-.002	N199 X2.9939
N90 X3.6007 Y.7686 Z-.0034	N200 X2.9891 Y1.7012
N91 X3.6232 Y.8014 Z-.0047	N201 Y1.
N92 X3.6312 Y.8403 Z-.0061	N202 Y.2988
N93 X3.6234 Y.8792 Z-.0075	N203 X2.9939 Y.294
N94 X3.601 Y.9121 Z-.0088	N204 X4.1012
N95 X3.5677 Y.9336 Z-.0102	N205 X4.106 Y.2988
N96 X3.5286 Y.9405 Z-.0115	N206 Y1.5362
N97 X3.4898 Y.9315 Z-.0129	N207 X4.1092 Y1.5538
N98 X3.4577 Y.9083 Z-.0143	N208 X4.1183 Y1.5691
N99 X3.4371 Y.8743 Z-.0156	N209 X4.1917 Y1.6534
N100 X3.4313 Y.835 Z-.017	N210 X4.2008 Y1.6687
N101 X3.4414 Y.7966 Z-.0184	N211 X4.204 Y1.6862
N102 X3.4655 Y.7651 Z-.0197	N212 Y1.7992
N103 X3.5001 Y.7455 Z-.0211	N213 X4.1992 Y1.804
N104 X3.5395 Y.7408 Z-.0225	N214 X2.8959
N105 X3.5777 Y.7519 Z-.0238	N215 X2.8911 Y1.7992
N106 X3.6085 Y.777 Z-.0252	N5661 G00 Z1.9685 M09
N107 X3.6271 Y.8121 Z-.0265	N5662 G91 G28 Z0
N108 X3.6306 Y.8517 Z-.0279	N5663 G28 X0 Y0
N109 X3.6184 Y.8895 Z-.0293	N5664 M30

#### **4.2.3 Parte Media de Articulación**

A continuación se muestra una parte del código G/M de la Parte Media de Articulación, el código completo fue de 10161 líneas.

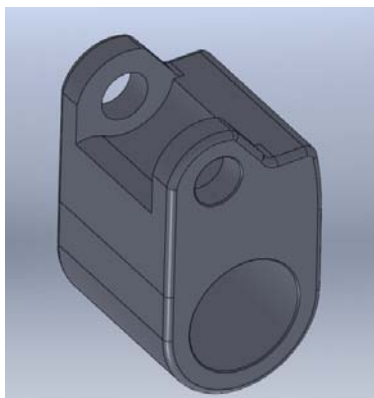


Figura 128. Imagen isométrica de Parte Media de Articulación.

O0460	N115 G00 Z.4995
N1 G20	N116 Z.9995 M09
N2 (1/2 2 FLUTE CRB EM)	N117 G91 G28 Z0
N3 G91 G28 X0 Y0 Z0	N118 (1/4 2 FLUTE CRB EM)
N4 T02 M06	N119 T01 M06
N5 S10000 M03	N120 S10000 M03
N6 G90 G59 G00 X-2.2583 Y.0522	N121 G90 G59 G00 X-1.1405 Y1.
N7 G43 Z.4995 H02 M08	N122 G43 Z.6 H01 M08
N8 G01 Z-.25 F1.25	N123 G01 Z.0087 F1.25
N9 G17 X-1.1166 F10.	N124 X-.0852 F10.
N10 G02 Y-.0522 I0 J-.0522	N125 Y.75
N11 G01 X-2.2583	N126 X-1.1405
N12 X-1.1166	N127 Y.5
N13 G03 Y.0522 I0 J.0522	N128 X-.0852
N14 G01 X-2.2583	N129 Y.25
N15 G03 Y-.0522 I0 J-.0522	N130 X-1.1405
N16 G00 Z.4995	N131 Y0
N17 Y.0522	N132 X-.0852
N18 Z.25	N133 Y-.25
N19 G01 Z-.3 F1.25	N134 X-1.1405
N20 X-1.1166 F10.	N135 Y-.5
N21 G02 Y-.0522 I0 J-.0522	N136 X-.0852
N22 G01 X-2.2583	N137 Y-.75
N23 X-1.1166	N138 X-1.1405
N24 G03 Y.0522 I0 J.0522	N139 Y-1.
N25 G01 X-2.2583	N140 X-.0852
N26 G03 Y-.0522 I0 J-.0522	N141 Y1.
N27 G00 Z.4995	N142 X-1.1405
N28 Y.0522	N143 Y-1.
N29 Z.2	N144 X-.0852
N30 G01 Z-.35 F1.25	N145 G00 Z.6
N31 X-1.1166 F10.	N146 X-1.1405 Y1.
N32 G02 Y-.0522 I0 J-.0522	N147 G01 Z-.0413 F1.25
N33 G01 X-2.2583	N148 X-.0852 F10.
N34 X-1.1166	N149 Y.75
N35 G03 Y.0522 I0 J.0522	N150 X-1.1405
N36 G01 X-2.2583	N151 Y.5

N37 G03 Y-.0522 I0 J-.0522  
N38 G00 Z.4995  
N39 Y.0522  
N40 Z.15  
N41 G01 Z-.4 F1.25  
N42 X-1.1166 F10.  
N43 G02 Y-.0522 I0 J-.0522  
N44 G01 X-2.2583  
N45 X-1.1166  
N46 G03 Y.0522 I0 J.0522  
N47 G01 X-2.2583  
N48 G03 Y-.0522 I0 J-.0522  
N49 G00 Z.4995  
N50 Y.0522  
N51 Z.1  
N52 G01 Z-.45 F1.25  
N53 X-1.1166 F10.  
N54 G02 Y-.0522 I0 J-.0522  
N55 G01 X-2.2583  
N56 X-1.1166  
N57 G03 Y.0522 I0 J.0522  
N58 G01 X-2.2583  
N59 G03 Y-.0522 I0 J-.0522  
N60 G00 Z.4995  
N61 Y.0522  
N62 Z.05  
N63 G01 Z-.5 F1.25  
N64 X-1.1166 F10.  
N65 G02 Y-.0522 I0 J-.0522  
N66 G01 X-2.2583  
N67 X-1.1166  
N68 G03 Y.0522 I0 J.0522  
N69 G01 X-2.2583  
N70 G03 Y-.0522 I0 J-.0522  
N71 G00 Z.4995  
N72 Y.0522  
N73 Z0  
N74 G01 Z-.55 F1.25  
N75 X-1.1166 F10.  
N76 G02 Y-.0522 I0 J-.0522  
N77 G01 X-2.2583  
N78 X-1.1166  
N79 G03 Y.0522 I0 J.0522  
N80 G01 X-2.2583  
N81 G03 Y-.0522 I0 J-.0522  
N82 G00 Z.4995  
N83 Y.0522  
N84 Z-.05  
N85 G01 Z-.6 F1.25  
N86 X-1.1166 F10.  
N152 X-.0852  
N153 Y.25  
N154 X-1.1405  
N155 Y0  
N156 X-.0852  
N157 Y-.25  
N158 X-1.1405  
N159 Y-.5  
N160 X-.0852  
N161 Y-.75  
N162 X-1.1405  
N163 Y-1.  
N164 X-.0852  
N165 Y1.  
N166 X-1.1405  
N167 Y-1.  
N168 X-.0852  
N169 G00 Z.6  
N170 X-1.1405 Y1.  
N171 Z.5587  
N172 G01 Z-.0913 F1.25  
N173 X-.0852 F10.  
N174 Y.75  
N175 X-1.1405  
N176 Y.5  
N177 X-.0852  
N178 Y.25  
N179 X-1.1405  
N180 Y0  
N181 X-.0852  
N182 Y-.25  
N183 X-1.1405  
N184 Y-.5  
N185 X-.0852  
N186 Y-.75  
N187 X-1.1405  
N188 Y-1.  
N189 X-.0852  
N190 Y1.  
N191 X-1.1405  
N192 Y-1.  
N193 X-.0852  
N194 G00 Z.6  
N195 X-1.1405 Y1.  
N196 Z.5087  
N197 G01 Z-.1413 F1.25  
N198 X-.0852 F10.  
N199 Y.75  
N200 X-1.1405  
N201 Y.5

N87 G02 Y-.0522 I0 J-.0522	N202 X-.0852
N88 G01 X-2.2583	N203 Y.25
N89 X-1.1166	N204 X-1.1405
N90 G03 Y.0522 I0 J.0522	N205 Y0
N91 G01 X-2.2583	N206 X-.0852
N92 G03 Y-.0522 I0 J-.0522	N207 Y-.25
N93 G00 Z.4995	N208 X-1.1405
N94 Y.0522	N209 Y-.5
N95 Z-.1	N210 X-.0852
N96 G01 Z-.65 F1.25	N211 Y-.75
N97 X-1.1166 F10.	N212 X-1.1405
N98 G02 Y-.0522 I0 J-.0522	N213 Y-1.
N99 G01 X-2.2583	N214 X-.0852
N100 X-1.1166	N215 Y1.
N101 G03 Y.0522 I0 J.0522	N216 X-1.1405
N102 G01 X-2.2583	N217 Y-1.
N103 G03 Y-.0522 I0 J-.0522	N218 X-.0852
N104 G00 Z.4995	N219 G00 Z.6
N105 Y.0522	N220 X-1.1405 Y1.
N106 Z-.15	N221 Z.4587
N107 G01 Z-.7 F1.25	N222 G01 Z-.1913 F1.25
N108 X-1.1166 F10.	N223 X-.0852 F10.
N109 G02 Y-.0522 I0 J-.0522	N224 Y.75
N110 G01 X-2.2583	N225 X-1.1405
N111 X-1.1166	N10158 Z.5401 F.4
N112 G03 Y.0522 I0 J.0522	N10159 G00 G91 G28 Z0
N113 G01 X-2.2583	N10160 G28 X0 Y0
N114 G03 Y-.0522 I0 J-.0522	N10161 M30

#### **4.2.4 Parte Inferior Tubular**

El código de esta pieza fue de 11212 líneas, a continuación se muestran algunas de ellas.

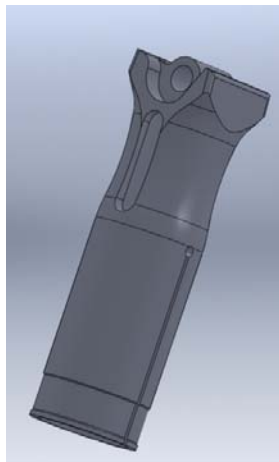


Figura 129. Imagen isométrica de Parte Inferior Tubular.

O0455  
N1 G20  
N2 (1/4 2 FLUTE CRB EM)  
N3 G91 G28 X0 Y0 Z0  
N4 T08 M06  
N5 S10000 M03  
N6 G90 G60 G00 X.9846 Y.7677  
N7 G43 Z1.178 H08 M08  
N8 G01 Z.178 F1.  
N9 G17 X.9867 Y.773 Z.1493  
N10 X.9925 Y.7882 Z.125  
N11 X1.0013 Y.8109 Z.1087  
N12 X1.0116 Y.8377 Z.103  
N13 X1.0182 Y.8769 Z.1016  
N14 X1.009 Y.9155 Z.1003  
N15 X.9856 Y.9476 Z.0989  
N16 X.9515 Y.9679 Z.0975  
N17 X.9121 Y.9734 Z.0962  
N18 X.8738 Y.9632 Z.0948  
N19 X.8424 Y.9388 Z.0935  
N20 X.823 Y.9041 Z.0921  
N21 X.8186 Y.8647 Z.0907  
N22 X.83 Y.8266 Z.0894  
N23 X.8552 Y.796 Z.088  
N24 X.8904 Y.7776 Z.0866  
N25 X.93 Y.7743 Z.0853  
N26 X.9677 Y.7867 Z.0839  
N27 X.9977 Y.8129 Z.0825  
N28 X1.015 Y.8486 Z.0812  
N29 X1.0172 Y.8882 Z.0798  
N30 X1.0037 Y.9256 Z.0785  
N31 X.9767 Y.9547 Z.0771  
N32 X.9405 Y.9711 Z.0757  
N33 X.9008 Y.9721 Z.0744  
N34 X.8638 Y.9575 Z.073  
N35 X.8355 Y.9297 Z.0716  
N36 X.8202 Y.8931 Z.0703  
N37 X.8203 Y.8534 Z.0689  
N38 X.8359 Y.8169 Z.0675  
N39 X.8645 Y.7893 Z.0662  
N40 X.9016 Y.775 Z.0648  
N41 X.9413 Y.7763 Z.0635  
N42 X.9773 Y.7929 Z.0621  
N43 X1.0041 Y.8223 Z.0607  
N44 X1.0173 Y.8598 Z.0594  
N45 X1.0149 Y.8994 Z.058  
N46 X.9972 Y.935 Z.0566  
N47 X.9671 Y.9609 Z.0553  
N48 X.9292 Y.973 Z.0539

N111 X.9236 Y.9735 Z-.032  
N112 X.8843 Y.9677 Z-.0334  
N113 X.8503 Y.947 Z-.0347  
N114 X.8271 Y.9148 Z-.0361  
N115 X.8183 Y.8761 Z-.0375  
N116 X.8252 Y.837 Z-.0388  
N117 X.8468 Y.8036 Z-.0402  
N118 X.8797 Y.7814 Z-.0415  
N119 X.9186 Y.7736 Z-.0429  
N120 X.9575 Y.7817 Z-.0443  
N121 X.9902 Y.8042 Z-.0456  
N122 X1.0116 Y.8377 Z-.047  
N123 X1.0097 Y.8404 F20.  
N124 X1.  
N125 X.9903  
N126 X.9883 Y.8384  
N127 X.9903 Y.8364  
N128 X1.0097  
N129 X1.0116 Y.8377  
N130 X1.0142 Y.864  
N131 X1.0031 Y.888  
N132 X.9812 Y.9029  
N133 X.9549 Y.9046  
N134 X.9313 Y.8927  
N135 X.9171 Y.8704  
N136 X.9163 Y.8439  
N137 X.9291 Y.8208  
N138 X.9518 Y.8074  
N139 X.9783 Y.8075  
N140 X1.0411 Y.8249  
N141 X1.0617 Y.8365  
N142 X1.0748 Y.8563  
N143 X1.0772 Y.8798  
N144 X1.0685 Y.9019  
N145 X1.0507 Y.9175  
N146 X1.0277 Y.9231  
N147 X1.  
N148 X.9105  
N149 X.9057 Y.9183  
N150 Y.7586  
N151 X.9105 Y.7538  
N152 X1.0895  
N153 X1.0944 Y.7586  
N154 Y.9183  
N155 X1.0895 Y.9231  
N156 X1.0277  
N157 X1.0037 Y.917  
N158 X.9856 Y.9002  
N159 X.9778 Y.8767

N49 X.8897 Y.9695 Z.0525  
N50 X.8546 Y.9508 Z.0512  
N51 X.8296 Y.9199 Z.0498  
N52 X.8186 Y.8818 Z.0485  
N53 X.8233 Y.8423 Z.0471  
N54 X.8429 Y.8078 Z.0457  
N55 X.8745 Y.7837 Z.0444  
N56 X.9129 Y.7738 Z.043  
N57 X.9522 Y.7796 Z.0416  
N58 X.9861 Y.8002 Z.0403  
N59 X1.0094 Y.8324 Z.0389  
N60 X1.0182 Y.8712 Z.0375  
N61 X1.0113 Y.9103 Z.0362  
N62 X.9897 Y.9436 Z.0348  
N63 X.9568 Y.9659 Z.0335  
N64 X.9178 Y.9736 Z.0321  
N65 X.879 Y.9656 Z.0307  
N66 X.8463 Y.943 Z.0294  
N67 X.8249 Y.9095 Z.028  
N68 X.8183 Y.8704 Z.0266  
N69 X.8274 Y.8317 Z.0253  
N70 X.8509 Y.7997 Z.0239  
N71 X.885 Y.7793 Z.0225  
N72 X.9243 Y.7738 Z.0212  
N73 X.9627 Y.7841 Z.0198  
N74 X.9941 Y.8084 Z.0185  
N75 X1.0135 Y.8431 Z.0171  
N76 X1.0178 Y.8826 Z.0157  
N77 X1.0065 Y.9206 Z.0144  
N78 X.9812 Y.9513 Z.013  
N79 X.946 Y.9697 Z.0116  
N80 X.9065 Y.9729 Z.0103  
N81 X.8687 Y.9605 Z.0089  
N82 X.8388 Y.9344 Z.0075  
N83 X.8214 Y.8987 Z.0062  
N84 X.8193 Y.859 Z.0048  
N85 X.8328 Y.8216 Z.0035  
N86 X.8598 Y.7925 Z.0021  
N87 X.896 Y.7761 Z.0007  
N88 X.9357 Y.7751 Z-.0006  
N89 X.9726 Y.7897 Z-.002  
N90 X1.001 Y.8175 Z-.0034  
N91 X1.0163 Y.8541 Z-.0047  
N92 X1.0162 Y.8939 Z-.0061  
N93 X1.0006 Y.9304 Z-.0075  
N94 X.972 Y.958 Z-.0088  
N95 X.9349 Y.9722 Z-.0102  
N96 X.8952 Y.9709 Z-.0115  
N97 X.8591 Y.9543 Z-.0129  
N98 X.8324 Y.9249 Z-.0143  
N160 X.9821 Y.8524  
N161 X.9976 Y.8332  
N162 X1.0204 Y.8236  
N163 X1.0449 Y.8262  
N164 X1.0653 Y.8402  
N165 X1.0765 Y.8622  
N166 X1.0757 Y.8869  
N167 X1.0481 Y.9833  
N168 X1.0379 Y1.0021  
N169 X1.0209 Y1.0149  
N170 X1. Y1.0195  
N171 X.8141  
N172 X.8093 Y1.0147  
N173 Y.6622  
N174 X.8141 Y.6573  
N175 X1.1859  
N176 X1.1908 Y.6622  
N177 Y1.0147  
N178 X1.1859 Y1.0195  
N179 X1.  
N180 X.9827 Y1.0226  
N181 X.9676 Y1.0314  
N182 X.8824 Y1.104  
N183 X.8673 Y1.1128  
N184 X.85 Y1.1159  
N185 X.7177  
N186 X.7128 Y1.1111  
N187 Y.5658  
N188 X.7177 Y.5609  
N189 X1.2824  
N190 X1.2872 Y.5658  
N191 Y1.1111  
N192 X1.2824 Y1.1159  
N193 X1.  
N194 X.85  
N195 X.8327 Y1.119  
N196 X.8176 Y1.1279  
N197 X.7324 Y1.2004  
N198 X.7173 Y1.2093  
N199 X.7 Y1.2123  
N200 X.6213  
N201 X.6164 Y1.2075  
N202 Y.4693  
N203 X.6213 Y.4645  
N204 X1.3788  
N205 X1.3836 Y.4693  
N206 Y1.2075  
N207 X1.3788 Y1.2123  
N208 X1.  
N209 X.7

N99 X.8192 Y.8875 Z-.0156  
N100 X.8216 Y.8478 Z-.017  
N101 X.8393 Y.8122 Z-.0184  
N102 X.8694 Y.7864 Z-.0197  
N103 X.9072 Y.7742 Z-.0211  
N104 X.9468 Y.7778 Z-.0225  
N105 X.9818 Y.7965 Z-.0238  
N106 X1.0069 Y.8273 Z-.0252  
N107 X1.0179 Y.8654 Z-.0265  
N108 X1.0132 Y.9049 Z-.0279  
N109 X.9936 Y.9394 Z-.0293  
N110 X.962 Y.9635 Z-.0306

N210 X.6827 Y1.2154  
N211 X.6676 Y1.2243  
N212 X.5824 Y1.2968  
N213 X.5673 Y1.3057  
N214 X.55 Y1.3087  
N215 X.531  
N216 X.5232 Y1.3055  
N217 X.52 Y1.2977  
N11209 G80 Z.4995 M09  
N11210 G91 G28 Z0  
N11211 G28 X0 Y0  
N11212 M30