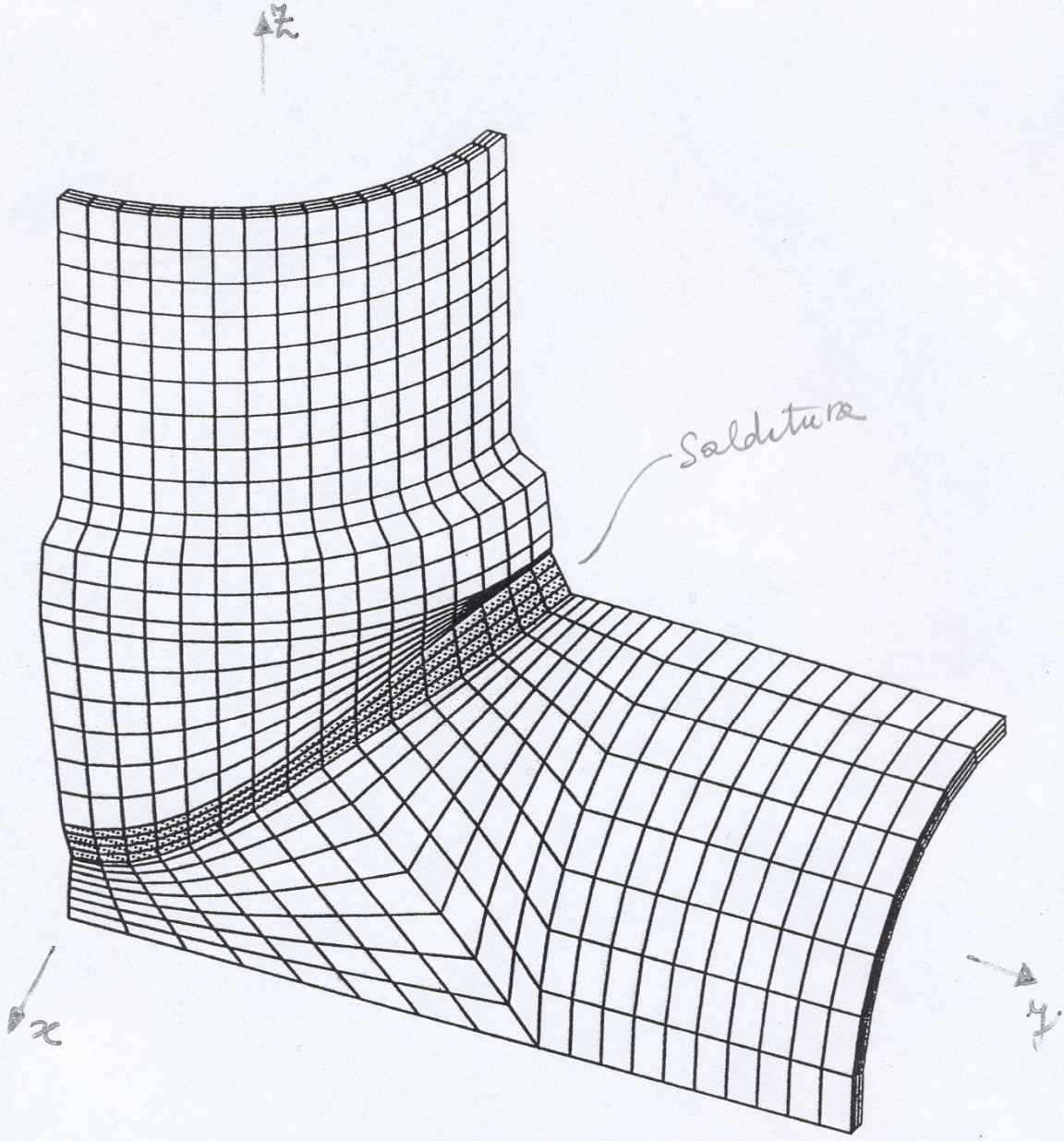
# Giunto di inserzione condotta/collettore

$p = 10$ MPa (Leg. 12)




- Spessore del giunto non trascurabile rispetto alle altre dimensioni ⇒ elem. solidi
- Riduzione a 1/4 delle dimensioni del problema (giusti vincoli)

```
Input processore giunti autorinforzanti per condotte in pressione
SYSTEM
L=1
:
C.....................................................................
JOINTS
   1   X= 109.55000   Y=   0.00000   Z= 281.05000     :[mm]
   2   X= 109.02249   Y=  10.73778   Z= 281.05000     :[mm]
   3   X= 107.44503   Y=  21.37214   Z= 281.05000     :[mm]
   4   X= 104.83281   Y=  31.80069   Z= 281.05000     :[mm]
   5   X= 101.21100   Y=  41.92297   Z= 281.05000     :[mm]
   6   X=  96.61447   Y=  51.64151   Z= 281.05000     :[mm]
   7   X=  91.08750   Y=  60.86272   Z= 281.05000     :[mm]
   8   X=  84.68330   Y=  69.49778   Z= 281.05000     :[mm]
   9   X=  77.46355   Y=  77.46355   Z= 281.05000     :[mm]
  10   X=  69.49778   Y=  84.68330   Z= 281.05000     :[mm]
.................

2590   X=  85.19238   Y= 288.00000   Z=  56.92373     :[mm]
2591   X=  72.45016   Y= 288.00000   Z=  72.45016     :[mm]
2592   X=  56.92373   Y= 288.00000   Z=  85.19238     :[mm]
2593   X=  39.20974   Y= 288.00000   Z=  94.66070     :[mm]
2594   X=  19.98895   Y= 288.00000   Z= 100.49126     :[mm]
2595   X=   0.00000   Y= 288.00000   Z= 102.46000     :[mm]
2596   X= 102.46000   Y= 300.00000   Z=   0.00000     :[mm]
2597   X= 100.49126   Y= 300.00000   Z=  19.98895     :[mm]
2598   X=  94.66070   Y= 300.00000   Z=  39.20974     :[mm]
2599   X=  85.19238   Y= 300.00000   Z=  56.92373     :[mm]
2600   X=  72.45016   Y= 300.00000   Z=  72.45016     :[mm]
2601   X=  56.92373   Y= 300.00000   Z=  85.19238     :[mm]
2602   X=  39.20974   Y= 300.00000   Z=  94.66070     :[mm]
2603   X=  19.98895   Y= 300.00000   Z= 100.49126     :[mm]
2604   X=   0.00000   Y= 300.00000   Z= 102.46000     :[mm]
:
C.....................................................................
RESTRAINTS
    1 2604    1   R=0,0,0,1,1,1    :FASE 0 - Blocco rotaz. (elementi solidi)
   17  561   17   R=1,0,0,1,1,1    :FASE 1 - PARETE 1
  561  651    9   R=1,0,0,1,1,1    :FASE 2 - PARETE 1
    1  545   17   R=0,1,0,1,1,1    :FASE 3 - PARETE 1
  545  553    1   R=0,0,1,1,1,1    :FASE 3B- PARETE 1
  553  643    9   R=0,0,1,1,1,1    :FASE 4 - PARETE 1
    1   17    1   R=0,0,1,1,1,1    :FASE 5 - PARETE 1
  643  651    1   R=0,1,0,1,1,1    :FASE 6 - PARETE 1
  668 1212   17   R=1,0,0,1,1,1    :FASE 1 - PARETE 2
 1212 1302    9   R=1,0,0,1,1,1    :FASE 2 - PARETE 2
  652 1196   17   R=0,1,0,1,1,1    :FASE 3 - PARETE 2
 1196 1204    1   R=0,0,1,1,1,1    :FASE 3B- PARETE 2
 1204 1294    9   R=0,0,1,1,1,1    :FASE 4 - PARETE 2
  652  668    1   R=0,0,1,1,1,1    :FASE 5 - PARETE 2
 1294 1302    1   R=0,1,0,1,1,1    :FASE 6 - PARETE 2
 1319 1863   17   R=1,0,0,1,1,1    :FASE 1 - PARETE 3
 1863 1953    9   R=1,0,0,1,1,1    :FASE 2 - PARETE 3
 1303 1847   17   R=0,1,0,1,1,1    :FASE 3 - PARETE 3
 1847 1855    1   R=0,0,1,1,1,1    :FASE 3B- PARETE 3
 1855 1945    9   R=0,0,1,1,1,1    :FASE 4 - PARETE 3
 1303 1319    1   R=0,0,1,1,1,1    :FASE 5 - PARETE 3
 1945 1953    1   R=0,1,0,1,1,1    :FASE 6 - PARETE 3
 1970 2514   17   R=1,0,0,1,1,1    :FASE 1 - PARETE 4
 2514 2604    9   R=1,0,0,1,1,1    :FASE 2 - PARETE 4
 1954 2498   17   R=0,1,0,1,1,1    :FASE 3 - PARETE 4
 2498 2506    1   R=0,0,1,1,1,1    :FASE 3B- PARETE 4
 2506 2596    9   R=0,0,1,1,1,1    :FASE 4 - PARETE 4
 1954 1970    1   R=0,0,1,1,1,1    :FASE 5 - PARETE 4
 2596 2604    1   R=0,1,0,1,1,1    :FASE 6 - PARETE 4
:
```

```
C.....................................................................
SOLID
P=1
1
E=2E5   U=0.3     :E in MPa
   1   JQ=  18,  19,   1,   2, 669, 670, 652, 653    M=1
   2   JQ=  19,  20,   2,   3, 670, 671, 653, 654    M=1
   3   JQ=  20,  21,   3,   4, 671, 672, 654, 655    M=1
   4   JQ=  21,  22,   4,   5, 672, 673, 655, 656    M=1
   5   JQ=  22,  23,   5,   6, 673, 674, 656, 657    M=1
   6   JQ=  23,  24,   6,   7, 674, 675, 657, 658    M=1
   7   JQ=  24,  25,   7,   8, 675, 676, 658, 659    M=1
   8   JQ=  25,  26,   8,   9, 676, 677, 659, 660    M=1
   9   JQ=  26,  27,   9,  10, 677, 678, 660, 661    M=1
  10   JQ=  27,  28,  10,  11, 678, 679, 661, 662    M=1
..............

1770   JQ=1946,1947,1937,1938,2597,2598,2588,2589    M=1
1771   JQ=1947,1948,1938,1939,2598,2599,2589,2590    M=1
1772   JQ=1948,1949,1939,1940,2599,2600,2590,2591    M=1
1773   JQ=1949,1950,1940,1941,2600,2601,2591,2592    M=1
1774   JQ=1950,1951,1941,1942,2601,2602,2592,2593    M=1
1775   JQ=1951,1952,1942,1943,2602,2603,2593,2594    M=1
1776   JQ=1952,1953,1943,1944,2603,2604,2594,2595    M=1
:
C.....................................................................
POTENTIAL
 1954 2604     P=  10.000     :[MPa]
```

S O L I D  E L E M E N T  S T R E S S E S

ELEM 1169 ==========

LOAD 1 ----------

| JOINT | S11 | S22 | S33 | S12 | S13 | S23 |
|---|---|---|---|---|---|---|
| 1285 | -3.243364 | 2.030722 | 145.243087 | -0.372518 | -14.325561 | -0.119189 |
| 1286 | -3.133035 | 8.633773 | 145.307115 | 0.211051 | -15.230847 | -0.237447 |
| 1936 | -2.856282 | 9.368709 | 145.906088 | -0.353814 | -14.343617 | -0.003591 |
| 1937 | -3.210100 | 15.030573 | 145.504921 | 0.135869 | -15.269171 | 0.220375 |
| 1276 | -2.885310 | 2.192674 | 145.381831 | 0.143702 | -15.225727 | -0.126722 |
| 1277 | -3.171255 | 8.775007 | 145.773072 | -0.293774 | -14.383186 | -0.345543 |
| 1927 | -2.802311 | 9.226579 | 145.335306 | 0.162406 | -15.222231 | 0.106062 |
| 1928 | -3.561264 | 14.867272 | 145.268706 | -0.391817 | -14.360826 | 0.227208 |

| JOINT | S-MAX | S-MID | S-MIN | MAX-1 | MAX-2 | MAX-3 | MIN-1 | MIN-2 | MIN-3 |
|---|---|---|---|---|---|---|---|---|---|
| 1285 | 146.612595 | 2.052587 | -4.634736 | -.095 | -.001 | .995 | .994 | .057 | .095 |
| 1286 | 146.854255 | 8.635891 | -4.682293 | -.101 | -.002 | .995 | .995 | -.014 | .101 |
| 1936 | 147.276477 | 9.377839 | -4.235801 | -.095 | .000 | .995 | .995 | .026 | .095 |
| 1937 | 147.056801 | 15.031506 | -4.762912 | -.101 | .002 | .995 | .995 | -.008 | .101 |
| 1276 | 146.929366 | 2.195094 | -4.435264 | -.101 | -.001 | .995 | .995 | -.020 | .101 |
| 1277 | 147.150026 | 8.782227 | -4.555428 | -.095 | -.002 | .995 | .995 | .024 | .095 |
| 1927 | 146.883383 | 9.228707 | -4.352517 | -.101 | .001 | .995 | .995 | -.013 | .101 |
| 1928 | 146.642264 | 14.873598 | -4.941146 | -.095 | .002 | .995 | .995 | .019 | .095 |

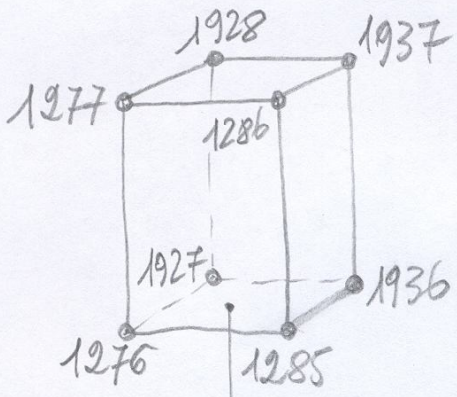
1276 X= 107.15333 Y= 276.00000 Z= 0.00000 :[mm]
1277 X= 105.09441 Y= 276.00000 Z= 20.90458 :[mm]
1278 X= 98.99677 Y= 276.00000 Z= 41.00581 :[mm]
1279 X= 89.09474 Y= 276.00000 Z= 59.53120 :[mm]
1280 X= 75.76885 Y= 276.00000 Z= 75.76885 :[mm]
1281 X= 59.53120 Y= 276.00000 Z= 89.09474 :[mm]
1282 X= 41.00581 Y= 276.00000 Z= 98.99677 :[mm]
1283 X= 20.90458 Y= 276.00000 Z= 105.09441 :[mm]
1284 X= 0.00000 Y= 276.00000 Z= 107.15333 :[mm]
1285 X= 107.15333 Y= 288.00000 Z= 0.00000 :[mm]
1286 X= 105.09441 Y= 288.00000 Z= 20.90458 :[mm]

1927 X= 104.80667 Y= 276.00000 Z= 0.00000 :[mm]
1928 X= 102.79284 Y= 276.00000 Z= 20.44677 :[mm]
1929 X= 96.82873 Y= 276.00000 Z= 40.10777 :[mm]
1930 X= 87.14356 Y= 276.00000 Z= 58.22746 :[mm]
1931 X= 74.10950 Y= 276.00000 Z= 74.10950 :[mm]
1932 X= 58.22746 Y= 276.00000 Z= 87.14356 :[mm]
1933 X= 40.10777 Y= 276.00000 Z= 96.82873 :[mm]
1934 X= 20.44677 Y= 276.00000 Z= 102.79284 :[mm]
1935 X= 0.00000 Y= 276.00000 Z= 104.80667 :[mm]
1936 X= 104.80667 Y= 288.00000 Z= 0.00000 :[mm]
1937 X= 102.79284 Y= 288.00000 Z= 20.44677 :[mm]

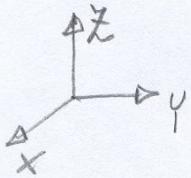
2604 X= 0.00000 Y= 300.00000 Z= 102.46000
651 X= 0.00000 Y= 300.00000 Z= 109.50000 t = 7.04 mm

145.243087
145.307115
145.906088
145.504921
145.381831
145.773072
145.335306
145.268706 media sigma sugli 8 nodi: 145.465027

Elemento #1169




Valutazione della $\sigma_c$ lontano dalla giunzione, sul collettore.




$\sigma_c = S33 \cong$ **145.47** MPa (Media tagli 8 modi)

Da relazione analitica:

$$\sigma_c = \frac{p\,r}{t} = \frac{10 \times 102{,}46}{7{,}04} = 145{,}54 \text{ MPa}$$

S O L I D  E L E M E N T  S T R E S S E S

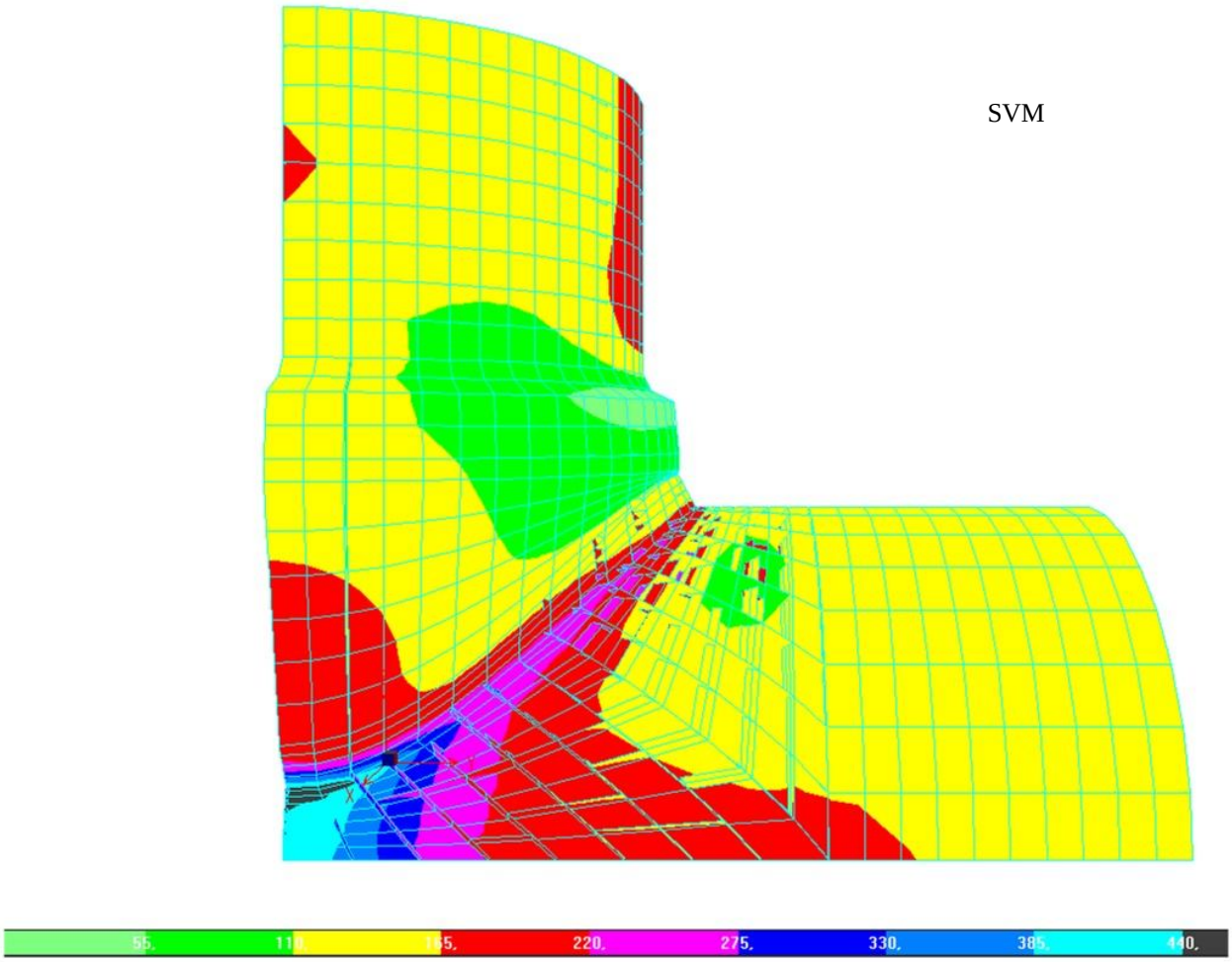
ELEM 433 ==========

LOAD 1 ----------

| JOINT | S11 | S22 | S33 | S12 | S13 | S23 |
|---|---|---|---|---|---|---|
| 477 | -6.592209 | 412.354648 | 431.390010 | -15.856872 | -71.079304 | 0.670632 |
| 478 | -0.586660 | 410.134869 | 429.212546 | 9.413835 | -65.013990 | -1.855755 |
| 1128 | 0.325962 | 263.101452 | 243.642025 | -21.323865 | -31.841673 | 4.508820 |
| 1129 | -18.753696 | 252.043219 | 235.103653 | 10.584461 | -42.338684 | 15.244644 |
| 460 | -10.853438 | 389.514022 | 422.962727 | 13.865322 | -79.558083 | 4.690496 |
| 461 | 22.812406 | 400.487545 | 435.709376 | -18.995850 | -65.329198 | -7.602480 |
| 1111 | -2.964155 | 245.341985 | 239.532145 | 9.733582 | -40.735252 | 9.538946 |
| 1112 | 6.414562 | 249.072113 | 248.467717 | -17.648705 | -42.946278 | 10.645664 |

| JOINT | S-MAX | S-MID | S-MIN | MAX-1 | MAX-2 | MAX-3 | MIN-1 | MIN-2 | MIN-3 |
|---|---|---|---|---|---|---|---|---|---|
| 477 | 442.964385 | 412.588705 | -18.400640 | -.159 | .104 | .982 | .987 | .036 | .156 |
| 478 | 439.189350 | 409.971563 | -10.400157 | -.148 | -.111 | .983 | .989 | -.021 | .146 |
| 1128 | 267.307658 | 245.111746 | -5.349965 | -.114 | .936 | .332 | .989 | .076 | .125 |
| 1129 | 261.672656 | 232.947944 | -26.227424 | -.053 | .827 | .559 | .986 | -.046 | .162 |
| 460 | 437.194634 | 389.916810 | -25.488134 | -.173 | .046 | .984 | .984 | -.035 | .175 |
| 461 | 446.273742 | 401.035257 | 11.700328 | -.147 | -.102 | .984 | .987 | .051 | .153 |
| 1111 | 253.848475 | 238.172286 | -10.110786 | -.086 | .698 | .711 | .986 | -.044 | .163 |
| 1112 | 266.723335 | 239.180916 | -1.949859 | -.168 | .627 | .761 | .984 | .062 | .166 |

SVM




S33