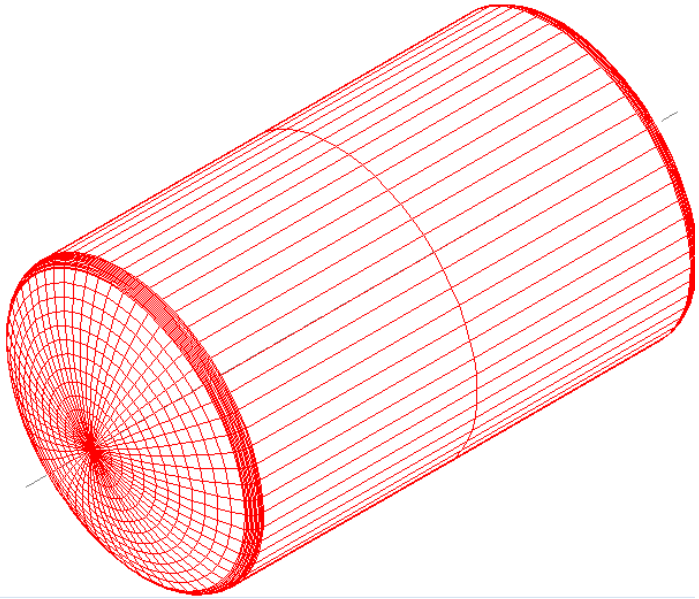


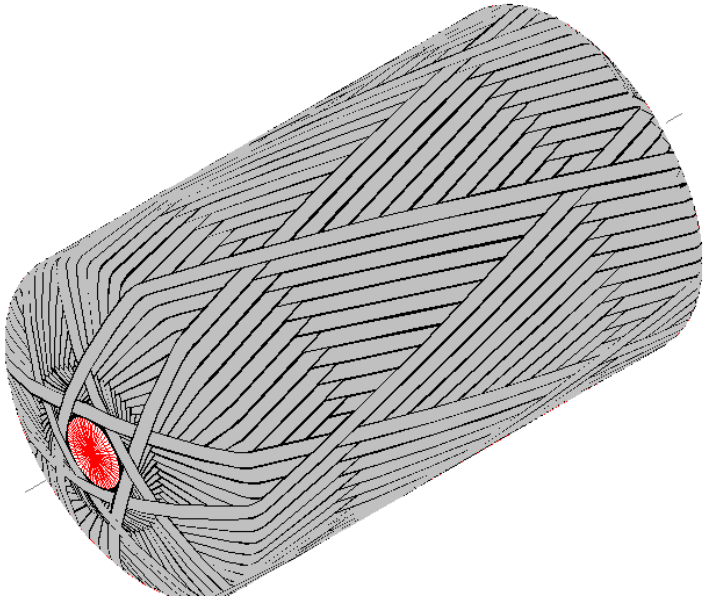
Cadfil Mandrel Definition Mesh (.mnd)

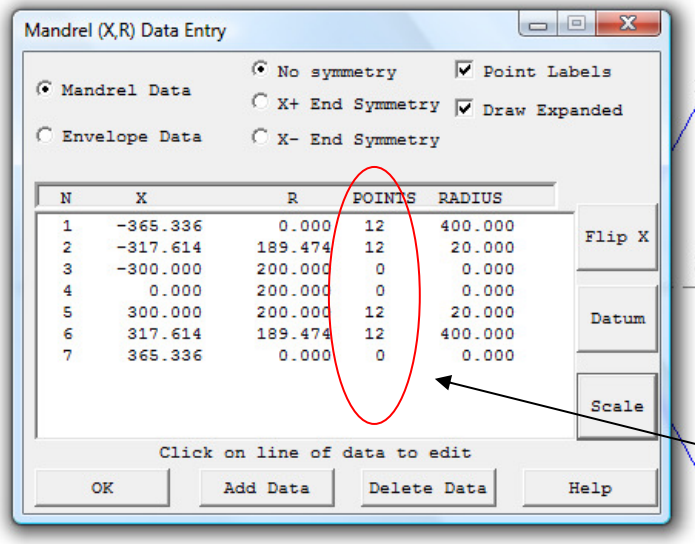
EXPORTING DATA FROM CADFIL FOR FINITE ELEMENT MODELING –

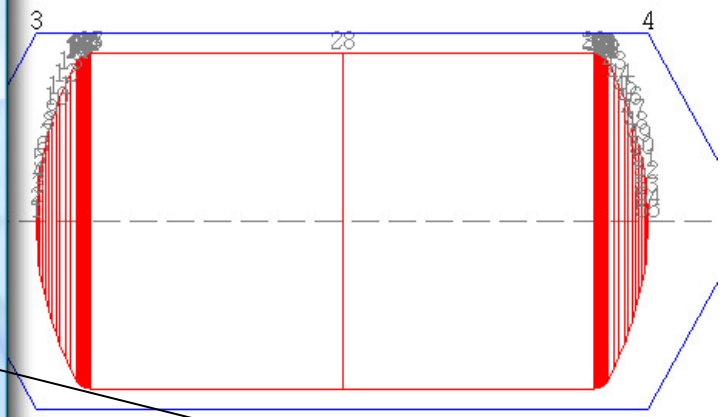
(Example creating NASTRAN Bulk Data File - bdf)

Winding Program Generated as normal and thickness Angle File (.th2) created

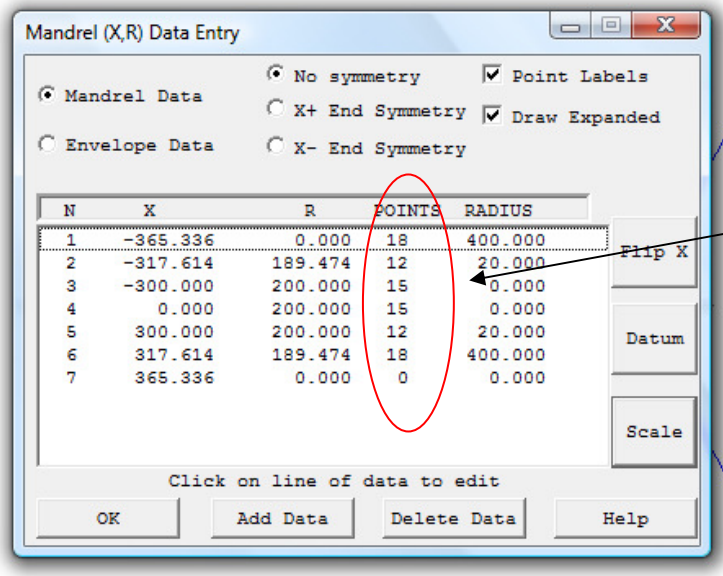
X	R	Angle	t/t0	Slope
-362.00000	51.02870	85.58755	12.84866	82.38777
-361.75000	52.89932	75.89994	13.91123	82.38777
-361.50000	54.76994	69.54415	15.46581	82.38777
-361.25000	56.64056	64.90489	16.05614	82.38777
-361.00000	58.51117	61.21518	16.61810	82.38777
-360.75000	60.38179	58.12904	15.27558	82.38777
-360.50000	61.85809	56.01766	12.01105	80.21295
-360.25000	63.30739	54.00607	10.42121	80.21295
-360.00000	64.75669	52.43104	9.36588	80.21295
.....				
.....				
.....				

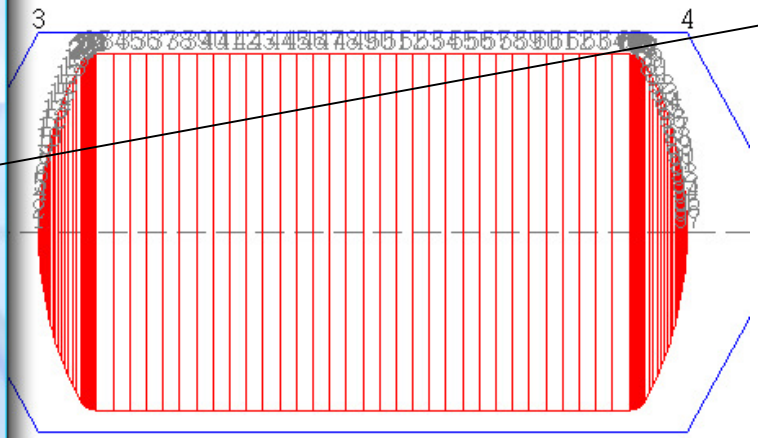




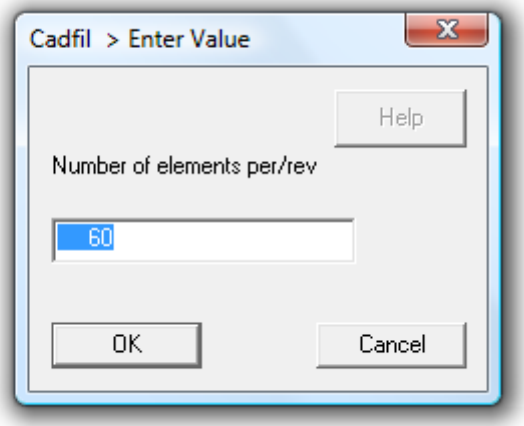


Original Mandel used for winding program shown in the Cadfil Mandrel Editor



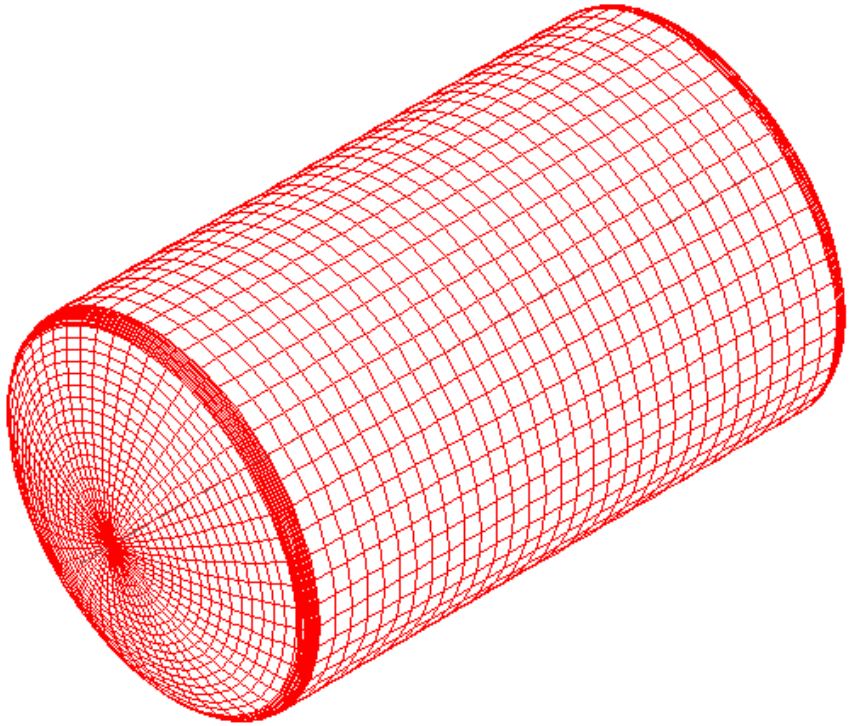


Meshing Grading changed to suite Analysis mesh requirements



Specify circumferential mesh grading to complete the surface mesh for the analysis

Final refined surface mesh for export.



The Nastran export option uses the re-graded mesh and one or more Cadfil thickness data files (.th2) to automatically write the bulk data file.

```
BEGIN BULK
$Nastran bdf file from cadfil, www.cadfil.com
$08-APR-12   21:40:54     V12
GRID*                   1                   -0.365336E+03    0.000000E+00*G000001
*G000001    0.000000E+00
GRID*                   2                   -0.365201E+03    0.000000E+00*G000002
*G000002    0.103877E+02
GRID*                   3                   -0.365201E+03    0.127653E+01*G000003
*G000003    0.103090E+02
GRID*                   4                   -0.365201E+03    0.253370E+01*G000004
*G000004    0.100740E+02
....
....
CTRIA3         49     101         1       50       51       49
CTRIA3         50     101         1       51       52       50
CTRIA3         51     101         1       52        2       51
CQUAD4         52     102         3        2       53       54       52
CQUAD4         53     102         4        3       54       55       53
CQUAD4         54     102         5        4       55       56       54
CQUAD4         55     102         6        5       56       57       55
....
....
CORD2R*                 49                   0  0.00000000E+00  0.00000000E+00*CA00049
*CA00049  0.00000000E+00 -0.99991542E+00 -0.39427841E-02  0.12393921E-01*CB00049
*CB00049  0.13005954E-01 -0.30312696E+00  0.95286142E+00
CORD2R*                 50                   0  0.00000000E+00  0.00000000E+00*CA00050
*CA00050  0.00000000E+00 -0.99991542E+00 -0.23898449E-02  0.12784501E-01*CB00050
*CB00050  0.13005953E-01 -0.18373390E+00  0.98288997E+00
CORD2R*                 51                   0  0.00000000E+00  0.00000000E+00*CA00051
*CA00051  0.00000000E+00 -0.99991542E+00 -0.80065724E-03  0.12981285E-01*CB00051
*CB00051  0.13005953E-01 -0.61555722E-01  0.99801891E+00
....
....
PCOMP          106   0.000                                                    +P100006
+P100006         1   0.749  64.588 YES           1   0.749 -64.588 YES
PCOMP          107   0.000                                                    +P100007
+P100007         1   0.393  50.014 YES           1   0.393 -50.014 YES
PCOMP          108   0.000                                                    +P100008
+P100008         1   0.304  41.496 YES           1   0.304 -41.496 YES
....
....
ENDDATA
```

MCID

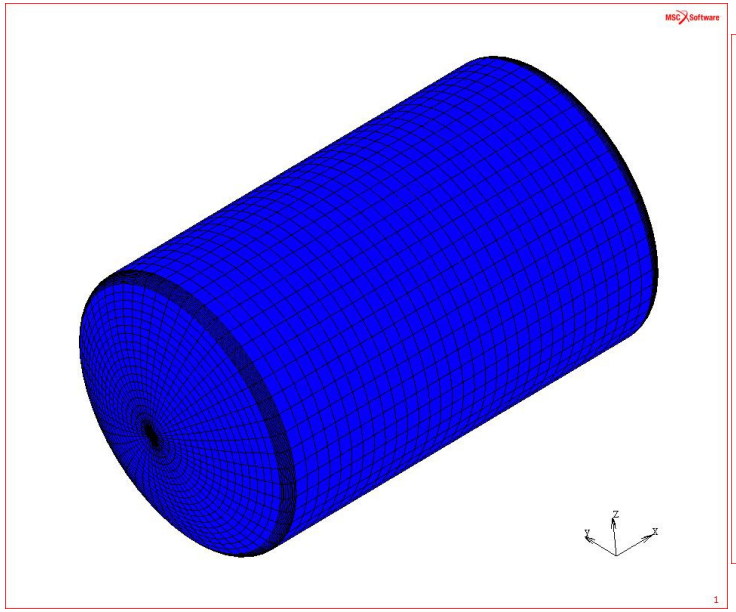
EXAMPLE BDF FILE

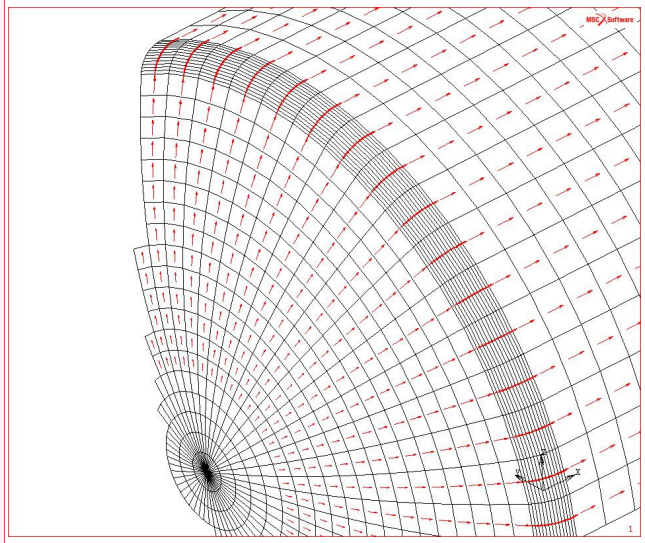
GRID – entries for the mesh point coordinate

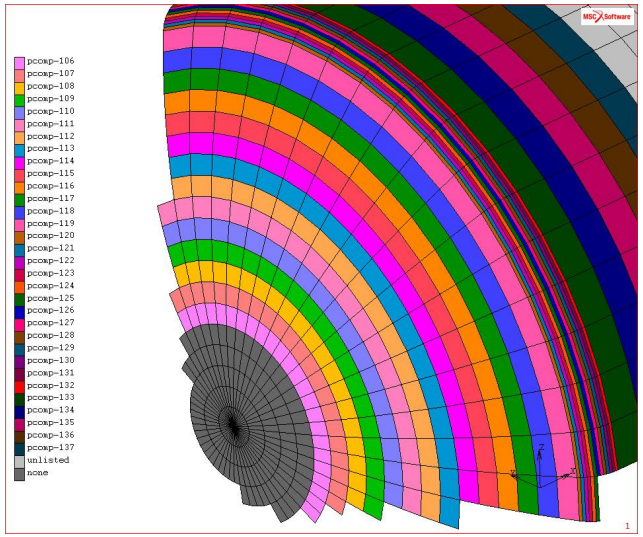
CTRIA3/CQUAD4 shell elements. Each element has a reference to an axis system (MCID) for the material direction (axes) and a reference to the laminate stack (PID) for the PCOMP cards.

CORD2R Cards define the material axis system for each and every element.

PCOMP entries define the ply stack with reference to an axis set (MCID). This is usually a balanced angle ply for each thickness file processed. PCOMP entries refers to a MAT8 card that defines the unidirectional material properties.







These Views are taken from the MSC Pre-Processor software after importing a Cadfil Bulk data file (.bdf). The View top left shows the full shell mesh. The View top middle shows the principal material orientations for the angle-plies. View top right shows the banded PCOMP entries. As can be see the PCOMP entries are in constant in bands around the mandrel as the winding angle and thickness are a constant around the band, only the ply orientation changes. The grey zone at the mandrel has been assigned a default (dummy) property because this area of the mandrel was not over-wound in CADFIL in this example.