APPENDIX 2 *TEXCAD Example*

A2.1 TEXCAD input

The actual TEXCAD run for the 2x2 2-D triaxial braided composite example presented in Chapter 3 follows:

```
THIS PROGRAM ANALYZES 2D AND 3D COMPOSITES

ENTER TYPE OF COMPOSITE FOR PRESENT ANALYSIS

   1 - 2D (LAMINATED) COMPOSITE
   2 - 3D SPATIALLY ORIENTED COMPOSITE
   3 - 2D WEAVES (PLAIN, 5/8-HARNESS SATIN)
   4 - 2D BRAIDS (PLAIN, 5/8-HARNESS SATIN)
   5 - 2D 2x2 TRIAXIAL BRAID
   6 - 2D 1x1 TRIAXIAL BRAIDS
   7 - 3D MULTI-INTERLOCK 5-LAYER BRAID
   8 - CUSTOMIZED TEXTILE UNIT CELL

ENTER 1 OR 2 OR 3 ...
5

STORE OUTPUT TO A FILE ? 1 - YES, 2 - NO
1

ENTER OUTPUT FILE NAME
sample.out

ENTER DESCRIPTIVE TITLE FOR PRESENT ANALYSIS/MODEL
2x2, 2D Triaxial Braided Composite, Sample Problem

ENTER TOTAL NO. OF MATERIALS IN PRESENT COMPOSITE
```

```
THIS INCLUDES YARNS AND INTERSTITIAL MATRIX
2

IS MATERIAL DATA STORED IN A FILE? 1 - YES, 2 - NO
ENTER  1  OR  2
1

ENTER MATERIAL DATA INPUT FILE NAME
material.dat

************************ NOTE ************************
  THE UNITS USED FOR ALL THE MATERIAL AND GEOMETRIC
  INPUT QUANTITIES MUST BE THE SAME THROUGHOUT !
  THE USER MAY USE EITHER ENGLISH OR SI UNITS, BUT
  THE SAME UNITS MUST BE USED CONSISTENTLY THROUGHOUT !
  THE TEXCAD OUTPUT WILL BE IN THE SAME UNITS THAT WERE
  USED FOR THE INPUT. TEXCAD DOES NOT CONVERT ANY UNITS.
*******************************************************


Enter Positive Braid Angle w.r.t. Axial Yarns (deg)
64.0
!!!!! USE CONSISTENT UNITS FOR ALL INPUT DATA !!!!!
Enter Axial Yarn spacing (actual distance between two yarns)
5.3
Enter Fractional Volume of Fibers in Yarns (eg: 0.75)
NOTE: This should be consistent with volume fraction
     used for impregnated yarn material properties
0.75
Enter Fiber Count of Braider Yarns (in thousands, K)
6
Enter Fiber Count of Axial Yarns (in thousands, K)
18
Enter MATERIAL ID for Braider Yarns
1
Enter MATERIAL ID for Axial Yarns
1
Enter Fiber Diameter for single Yarn Filament
0.007
Enter Desired Composite Fiber Volume Fraction (%)
55.26

***********************************************
 UNIT CELL GEOMETRY (UCG) AND YARN ARCHITECTURE
 DATA IS STORED IN A TEXT FILE - UNITCEL.DAT
 !!!!!!!!!!!!!
 !! CAUTION !! - UNITCEL.DAT IS UPDATED AT EVERY
 !!!!!!!!!!!!!   NEW EXECUTION RUN OF THIS CODE

 A GENERIC GRAPHICAL REPRESENTATION OF THE UCG AND
 YARN ARCHITECTURE IS STORED IN A WINDOWS PAINTBRUSH
 FILE CALLED
              2X2TRBRD.PCX
 USE WINDOWS PAINTBRUSH TO VIEW/PRINT THIS FILE
```

```
***********************************************

ENTER NO. OF EQUAL SLICES FOR UNDULATING PORTION OF YARN
 *** NOTE: 12 SLICES ARE USUALLY ENOUGH FOR CONVERGENCE
 *** NOTE: USE EVEN NUMBER OF SLICES
12


********************** NOTE ************************
TEXCAD WILL CALCULATE [A], [B], AND [D] MATRICES FOR
MULTIPLE STACKED LAYERS OF THE TEXTILE UNIT CELL (UC).
IF A SINGLE LAYER IS CHOSEN THEN [A][B][D] MATRICES
FOR THE UC ARCHITECTURE ARE NOT CALCULATED.
NOTE: [A][B][D] MATRIX CALCULATIONS HAVE NOT BEEN
     EXPERIMENTALLY VERIFIED
*****************************************************

DO YOU WISH TO ANALYZE:
1 -  A SINGLE LAYER OF THE UNIT CELL (UC) ARCHITECTURE
2 -  STACKED UNIDIRECTIONAL OR MULTI-DIRECTIONAL LAYERS
 ENTER 1 OR 2
1

FINISHED OVERALL STIFFNESS CALCULATIONS ...
********************** NOTE ************************
   TEXCAD CURRENTLY CALCULATES STRESSES/FAILURE
   EITHER FOR A SINGLE LAYER OF THE TEXTILE UNIT CELL
   OR FOR STACKED LAYERS WITH THE SAME ORIENTATION
*****************************************************
PROCEED TO CALCULATE TEXTILE UNIT CELL STRESSES/FAILURE
 1 - YES, 2 - NO
1

THE EFFECT OF CURING STRESSES CAN BE INCLUDED IN THE
ANALYSES FOR INTERNAL STRESSES AND STRENGTH
INCLUDE THERMAL RESIDUAL STRESSES IN PRESENT ANALYSIS ?
 1 - YES, 2 - NO
2

THE EFFECT OF YARN BENDING ON AXIAL YARN STRAINS/STRESSES
IS ACCOUNTED FOR BY USING A BEAM ON ELASTIC FOUNDATION MODEL
ACCOUNT FOR YARN BENDING EFFECTS ? 1 - YES, 2 - NO
1

FOR A GIVEN APPLIED STRESS STATE USE A LINEAR ELASTIC
(NON-INCREMENTAL) ANALYSIS TO COMPUTE STRESSES/STRAINS
IN YARN SLICES ?    1 - YES, 2 - NO
2

FOR AN APPLIED STRESS STATE USE INCREMENTAL APPROACH TO
COMPUTE STRENGTH, FAILURE MODE, STRESS-STRAIN RESPONSE?
1 - YES, 2 - NO
1
```

ENTER APPLIED SIG-XX,SIG-YY,SIG-ZZ,TAU-XY,TAU-YZ,TAU-ZX
ONLY INPLANE LOADING CASES HAVE BEEN CURRENTLY VERIFIED

FOR UNIAXIAL LOADING
ENTER MAXIMUM EXPECTED STRENGTH IN LOADING DIRECTION AND
FOR APPLIED STRESSES IN OTHER DIRECTIONS ENTER 0.0
FOR COMBINED LOADING
ENTER MAXIMUM EXPECTED STRENGTH FOR THE STRESS DIRECTION
WHICH HAS THE LARGEST EXPECTED STRENGTH. SCALE THE OTHER
APPLIED STRESSES TO REFLECT THE REQUIRED LOAD RATIOS.
---
*Note: XYZ axes shown in the architecture graphics file
0.,1.e9,0.,0.,0.,0.

ENTER No. OF STRESS INCREMENTS FOR INCREMENTAL ANALYSIS
EACH INCREMENT TAKES 2 SEC PER YARN ON A 486-25 MHz PC
IN MOST CASES 100 INCREMENTS SHOULD BE SUFFICIENT
100
ACCOUNT FOR LARGE DEFORMATIONS ? 1 - YES, 2 - NO
1
STORE YARN SLICE FAILURE HISTORY IN “FAILURE.LOG” FILE ?
1- YES, 2 - NO
2
UNIT CELL STRESS-STRAIN RESPONSE MAY BE REQUESTED FOR :
(1) IN-PLANE STRESSES AND STRAINS
(2) OUT-OF-PLANE STRESSES AND STRAINS
ENTER 1 OR 2
1

STRESS-STRAIN RESPONSE

	XX		YY		XY	
INC	STRESS	STRAIN	STRESS	STRAIN	STRESS	STRAIN
1	.00000E+00	-.47443E-04	.10000E+08	.20553E-03	.00000E+00	-.19437E-19
2	.00000E+00	-.94886E-04	.20000E+08	.41106E-03	.00000E+00	-.27192E-19
3	.00000E+00	-.14233E-03	.30000E+08	.61659E-03	.00000E+00	-.59265E-19
4	.00000E+00	-.18977E-03	.40000E+08	.82213E-03	.00000E+00	-.81163E-19
5	.00000E+00	-.23722E-03	.50000E+08	.10277E-02	.00000E+00	-.12133E-18
6	.00000E+00	-.28467E-03	.60000E+08	.12332E-02	.00000E+00	-.17274E-18
7	.00000E+00	-.33212E-03	.70000E+08	.14387E-02	.00000E+00	-.19499E-18
8	.00000E+00	-.37958E-03	.80000E+08	.16443E-02	.00000E+00	-.23906E-18
9	.00000E+00	-.42705E-03	.90000E+08	.18498E-02	.00000E+00	-.28106E-18
10	.00000E+00	-.47452E-03	.10000E+09	.20554E-02	.00000E+00	-.31344E-18
11	.00000E+00	-.52201E-03	.11000E+09	.22610E-02	.00000E+00	-.34216E-18
12	.00000E+00	-.56951E-03	.12000E+09	.24666E-02	.00000E+00	-.35782E-18
13	.00000E+00	-.61702E-03	.13000E+09	.26722E-02	.00000E+00	-.40786E-18
14	.00000E+00	-.66455E-03	.14000E+09	.28778E-02	.00000E+00	-.42248E-18
15	.00000E+00	-.71210E-03	.15000E+09	.30834E-02	.00000E+00	-.45307E-18
16	.00000E+00	-.76481E-03	.16000E+09	.33119E-02	.00000E+00	-.49675E-18
17	.00000E+00	-.81753E-03	.17000E+09	.35403E-02	.00000E+00	-.56897E-18
18	.00000E+00	-.87026E-03	.18000E+09	.37688E-02	.00000E+00	-.60295E-18
19	.00000E+00	-.92299E-03	.19000E+09	.39972E-02	.00000E+00	-.63125E-18
20	.00000E+00	-.97573E-03	.20000E+09	.42257E-02	.00000E+00	-.65389E-18

21	.00000E+00	-.10285E-02	.21000E+09	.44542E-02	.00000E+00	-.69924E-18
22	.00000E+00	-.10812E-02	.22000E+09	.46827E-02	.00000E+00	-.75957E-18
23	.00000E+00	-.11340E-02	.23000E+09	.49112E-02	.00000E+00	-.81281E-18
24	.00000E+00	-.11868E-02	.24000E+09	.51398E-02	.00000E+00	-.84351E-18
25	.00000E+00	-.12396E-02	.25000E+09	.53683E-02	.00000E+00	-.89911E-18
26	.00000E+00	-.12924E-02	.26000E+09	.55969E-02	.00000E+00	-.97702E-18
27	.00000E+00	-.13453E-02	.27000E+09	.58254E-02	.00000E+00	-.10564E-17
28	.00000E+00	-.13981E-02	.28000E+09	.60540E-02	.00000E+00	-.10883E-17
29	.00000E+00	-.14510E-02	.29000E+09	.62826E-02	.00000E+00	-.11298E-17
30	.00000E+00	-.15039E-02	.30000E+09	.65113E-02	.00000E+00	-.11786E-17
31	.00000E+00	-.15568E-02	.31000E+09	.67399E-02	.00000E+00	-.12497E-17
32	.00000E+00	-.16097E-02	.32000E+09	.69686E-02	.00000E+00	-.12994E-17
33	.00000E+00	-.16627E-02	.33000E+09	.71973E-02	.00000E+00	-.13766E-17
34	.00000E+00	-.17156E-02	.34000E+09	.74260E-02	.00000E+00	-.14079E-17
35	.00000E+00	-.17686E-02	.35000E+09	.76547E-02	.00000E+00	-.14718E-17
36	.00000E+00	-.18217E-02	.36000E+09	.78835E-02	.00000E+00	-.15096E-17
37	.00000E+00	-.18747E-02	.37000E+09	.81123E-02	.00000E+00	-.15692E-17
38	.00000E+00	-.19278E-02	.38000E+09	.83411E-02	.00000E+00	-.16347E-17
39	.00000E+00	-.19809E-02	.39000E+09	.85699E-02	.00000E+00	-.16592E-17
40	.00000E+00	-.20340E-02	.40000E+09	.87988E-02	.00000E+00	-.17078E-17
41	.00000E+00	-.20872E-02	.41000E+09	.90277E-02	.00000E+00	-.17474E-17
42	.00000E+00	-.21404E-02	.42000E+09	.92566E-02	.00000E+00	-.17697E-17
43	.00000E+00	-.21936E-02	.43000E+09	.94856E-02	.00000E+00	-.17939E-17
44	.00000E+00	-.22468E-02	.44000E+09	.97145E-02	.00000E+00	-.18248E-17
45	.00000E+00	-.23001E-02	.45000E+09	.99436E-02	.00000E+00	-.18705E-17
46	.00000E+00	-.23534E-02	.46000E+09	.10173E-01	.00000E+00	-.18926E-17
47	.00000E+00	-.24067E-02	.47000E+09	.10402E-01	.00000E+00	-.19437E-17
48	.00000E+00	-.24601E-02	.48000E+09	.10631E-01	.00000E+00	-.19977E-17
49	.00000E+00	-.25135E-02	.49000E+09	.10860E-01	.00000E+00	-.20653E-17
50	.00000E+00	-.25670E-02	.50000E+09	.11089E-01	.00000E+00	-.21204E-17
51	.00000E+00	-.26204E-02	.51000E+09	.11318E-01	.00000E+00	-.21238E-17
52	.00000E+00	-.26739E-02	.52000E+09	.11548E-01	.00000E+00	-.21607E-17
53	.00000E+00	-.27274E-02	.53000E+09	.11777E-01	.00000E+00	-.22027E-17
54	.00000E+00	-.27810E-02	.54000E+09	.12006E-01	.00000E+00	-.22505E-17
55	.00000E+00	-.28346E-02	.55000E+09	.12235E-01	.00000E+00	-.22767E-17
56	.00000E+00	-.28882E-02	.56000E+09	.12465E-01	.00000E+00	-.23172E-17
57	.00000E+00	-.29419E-02	.57000E+09	.12694E-01	.00000E+00	-.23587E-17
58	.00000E+00	-.29956E-02	.58000E+09	.12924E-01	.00000E+00	-.24121E-17
59	.00000E+00	-.30493E-02	.59000E+09	.13153E-01	.00000E+00	-.24568E-17
60	.00000E+00	-.31031E-02	.60000E+09	.13383E-01	.00000E+00	-.25219E-17
61	.00000E+00	-.31568E-02	.61000E+09	.13612E-01	.00000E+00	-.25445E-17
62	.00000E+00	-.32107E-02	.62000E+09	.13842E-01	.00000E+00	-.25919E-17
63	.00000E+00	-.32645E-02	.63000E+09	.14071E-01	.00000E+00	-.26344E-17

PRINT FINAL STRESSES/STRAINS IN YARNS ? 1 - YES, 2 - NO
2
Stop - Program terminated.

A2.2 TEXCAD output

The output file SAMPLE.OUT, created by the above TEXCAD execution, follows:

```
2x2, 2D Triaxial Braided Composite, Sample Problem


* MATERIAL ID NO.
   1
* E11, E22, NU12, G12, NU23, ALFA11, ALFA22, SE
 .1448E+12 .1173E+11 .2300E+00 .5516E+10 .3000E+00-.3240E-06 .1400E-04 .2780E+01
* STEN11, SCOMP11, STEN22, SCOMP22, SHEAR12, SHEAR23
  .1400E-01  .1000E-01  .2600E+08  .2060E+09  .8750E+08  .1024E+09
* MATERIAL ID NO.
   2
* E11, E22, NU12, G12, NU23, ALFA11, ALFA22, SE
 .3448E+10 .3448E+10 .3500E+00 .1276E+10 .3500E+00 .4000E-04 .4000E-04 .2340E+01
* STEN11, SCOMP11, STEN22, SCOMP22, SHEAR12, SHEAR23
  .8485E+08  .8485E+08  .8485E+08  .8485E+08  .9830E+08  .9830E+08


         2x2 TRIAXIAL BRAID PARAMETERS - INPUT

 BRAID ANGLE =  64.00              AXIAL YARN SPACING =   5.300
 BRAIDER YARN SIZE (k) =    6       AXIAL YARN SIZE (k) =   18
 YARN PACKING DENSITY =    .750     COMPOSITE Vf (%) =  55.260


         2x2 TRIAXIAL BRAID PARAMETERS - CALCULATED

     FRACTIONAL VOLUME OF Yarns IN UNIT CELL = .73679
     FRACTIONAL VOLUME OF Interstitial Matrix IN UNIT CELL = .26321
     FRACTIONAL VOLUME OF Fibers IN UNIT CELL = .55259
     LAYER THICKNESS =    .596


        Braider Yarn Undulation Parameters
 Crimp Angle =   9.516
 Sinusoidal Undulation Length =   4.051
 Vertical Shift at Cross Over Point =    .432


             Yarn Characteristics
          Braider Yarns      Axial Yarns
 Thickness       .164             .268
 C/S Area        .308             .924
 Proj. Length  11.794            20.680
 % Yarns       60.330            39.670
```

OVERALL STIFFNESS MATRIX FOR UNIT CELL
COMPONENTS ARE IN FOLLOWING ORDER - XX,YY,ZZ,XY,YZ,ZX

.49339E+11 .12444E+11 .41142E+10 -.30769E-05 .39768E-08 -.29636E-06
.12444E+11 .52498E+11 .37858E+10 .10512E-05 -.29745E-08 -.84142E-07
.41142E+10 .37858E+10 .11058E+11 .82302E-08 -.19245E-09 -.22789E-07
-.15138E-05 .89885E-06 .71106E-08 .13181E+11 -.74771E-07 -.20204E-08
.61586E-08 .83057E-09 -.52445E-10 -.45362E-07 .41450E+10 .39359E-07
-.23146E-06 -.56224E-07 -.22477E-07 -.90919E-08 .51677E-07 .44504E+10

OVERALL COMPLIANCE MATRIX FOR UNIT CELL
COMPONENTS ARE IN FOLLOWING ORDER - XX,YY,ZZ,XY,YZ,ZX

.22012E-10 -.47443E-11 -.65655E-11 .55211E-26 -.24828E-28 .13425E-26
-.47443E-11 .20553E-10 -.52715E-11 -.27435E-26 .19056E-28 .45670E-28
-.65655E-11 -.52715E-11 .94683E-10 -.11714E-26 .69123E-29 -.52037E-28
.28551E-26 -.19437E-26 -.44564E-27 .75869E-10 .13686E-26 .34444E-28
-.31838E-28 .28640E-29 .12009E-28 .83029E-27 .24125E-09 -.21336E-26
.10517E-26 -.13708E-28 .70139E-28 .15500E-27 -.28014E-26 .22470E-09

UNIT CELL OVERALL PROPERTIES

EXX = .45430E+11 EYY = .48654E+11 EZZ = .10562E+11

NuXY = .21553 NuYX = .23083

NuXZ = .29827 NuYZ = .25648

GXY = .13181E+11 GYZ = .41450E+10 GXZ = .44504E+10

UNIT CELL OVERALL THERMAL COEFFICIENTS

ALPHAXX ALPHAYY ALPHAZZ ALPHAXY ALPHAYZ ALPHAZX
.21084E-05 .20559E-05 .25130E-04 -.29116E-21 -.48209E-23 .38730E-21

INCREMENTAL ANALYSIS RESULTS

APPLIED STRESSES TO UC: SIG-XX,SIG-YY,SIG-ZZ,TAU-XY,TAU-YZ,TAU-ZX

.00000E+00 .10000E+10 .00000E+00 .00000E+00 .00000E+00 .00000E+00

*** YARN BENDING EFFECTS INCLUDED ***

*** LARGE DEFORMATION EFFECTS INCLUDED ***

STRESS-STRAIN RESPONSE

	XX		YY		XY	
INC	STRESS	STRAIN	STRESS	STRAIN	STRESS	STRAIN
1	.00000E+00	-.47443E-04	.10000E+08	.20553E-03	.00000E+00	-.19437E-19
2	.00000E+00	-.94886E-04	.20000E+08	.41106E-03	.00000E+00	-.27192E-19
3	.00000E+00	-.14233E-03	.30000E+08	.61659E-03	.00000E+00	-.59265E-19
4	.00000E+00	-.18977E-03	.40000E+08	.82213E-03	.00000E+00	-.81163E-19
5	.00000E+00	-.23722E-03	.50000E+08	.10277E-02	.00000E+00	-.12133E-18
6	.00000E+00	-.28467E-03	.60000E+08	.12332E-02	.00000E+00	-.17274E-18
7	.00000E+00	-.33212E-03	.70000E+08	.14387E-02	.00000E+00	-.19499E-18
8	.00000E+00	-.37958E-03	.80000E+08	.16443E-02	.00000E+00	-.23906E-18
9	.00000E+00	-.42705E-03	.90000E+08	.18498E-02	.00000E+00	-.28106E-18
10	.00000E+00	-.47452E-03	.10000E+09	.20554E-02	.00000E+00	-.31344E-18
11	.00000E+00	-.52201E-03	.11000E+09	.22610E-02	.00000E+00	-.34216E-18
12	.00000E+00	-.56951E-03	.12000E+09	.24666E-02	.00000E+00	-.35782E-18
13	.00000E+00	-.61702E-03	.13000E+09	.26722E-02	.00000E+00	-.40786E-18
14	.00000E+00	-.66455E-03	.14000E+09	.28778E-02	.00000E+00	-.42248E-18
15	.00000E+00	-.71210E-03	.15000E+09	.30834E-02	.00000E+00	-.45307E-18
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 1					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 2					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 3					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 4					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 5					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 6					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 7					
	25 YARN SLICES FAILED IN TRANSVERSE (22) MODE IN YARN ID. 8					
16	.00000E+00	-.76481E-03	.16000E+09	.33119E-02	.00000E+00	-.49675E-18
17	.00000E+00	-.81753E-03	.17000E+09	.35403E-02	.00000E+00	-.56897E-18
18	.00000E+00	-.87026E-03	.18000E+09	.37688E-02	.00000E+00	-.60295E-18
19	.00000E+00	-.92299E-03	.19000E+09	.39972E-02	.00000E+00	-.63125E-18
20	.00000E+00	-.97573E-03	.20000E+09	.42257E-02	.00000E+00	-.65389E-18
21	.00000E+00	-.10285E-02	.21000E+09	.44542E-02	.00000E+00	-.69924E-18
22	.00000E+00	-.10812E-02	.22000E+09	.46827E-02	.00000E+00	-.75957E-18
23	.00000E+00	-.11340E-02	.23000E+09	.49112E-02	.00000E+00	-.81281E-18
24	.00000E+00	-.11868E-02	.24000E+09	.51398E-02	.00000E+00	-.84351E-18
25	.00000E+00	-.12396E-02	.25000E+09	.53683E-02	.00000E+00	-.89911E-18
26	.00000E+00	-.12924E-02	.26000E+09	.55969E-02	.00000E+00	-.97702E-18
27	.00000E+00	-.13453E-02	.27000E+09	.58254E-02	.00000E+00	-.10564E-17
28	.00000E+00	-.13981E-02	.28000E+09	.60540E-02	.00000E+00	-.10883E-17
29	.00000E+00	-.14510E-02	.29000E+09	.62826E-02	.00000E+00	-.11298E-17
30	.00000E+00	-.15039E-02	.30000E+09	.65113E-02	.00000E+00	-.11786E-17
31	.00000E+00	-.15568E-02	.31000E+09	.67399E-02	.00000E+00	-.12497E-17
32	.00000E+00	-.16097E-02	.32000E+09	.69686E-02	.00000E+00	-.12994E-17
33	.00000E+00	-.16627E-02	.33000E+09	.71973E-02	.00000E+00	-.13766E-17
34	.00000E+00	-.17156E-02	.34000E+09	.74260E-02	.00000E+00	-.14079E-17
35	.00000E+00	-.17686E-02	.35000E+09	.76547E-02	.00000E+00	-.14718E-17
36	.00000E+00	-.18217E-02	.36000E+09	.78835E-02	.00000E+00	-.15096E-17
37	.00000E+00	-.18747E-02	.37000E+09	.81123E-02	.00000E+00	-.15692E-17
38	.00000E+00	-.19278E-02	.38000E+09	.83411E-02	.00000E+00	-.16347E-17
39	.00000E+00	-.19809E-02	.39000E+09	.85699E-02	.00000E+00	-.16592E-17
40	.00000E+00	-.20340E-02	.40000E+09	.87988E-02	.00000E+00	-.17078E-17
41	.00000E+00	-.20872E-02	.41000E+09	.90277E-02	.00000E+00	-.17474E-17
42	.00000E+00	-.21404E-02	.42000E+09	.92566E-02	.00000E+00	-.17697E-17
43	.00000E+00	-.21936E-02	.43000E+09	.94856E-02	.00000E+00	-.17939E-17

44 .00000E+00 -.22468E-02 .44000E+09 .97145E-02 .00000E+00 -.18248E-17
45 .00000E+00 -.23001E-02 .45000E+09 .99436E-02 .00000E+00 -.18705E-17
46 .00000E+00 -.23534E-02 .46000E+09 .10173E-01 .00000E+00 -.18926E-17
47 .00000E+00 -.24067E-02 .47000E+09 .10402E-01 .00000E+00 -.19437E-17
48 .00000E+00 -.24601E-02 .48000E+09 .10631E-01 .00000E+00 -.19977E-17
49 .00000E+00 -.25135E-02 .49000E+09 .10860E-01 .00000E+00 -.20653E-17
50 .00000E+00 -.25670E-02 .50000E+09 .11089E-01 .00000E+00 -.21204E-17
51 .00000E+00 -.26204E-02 .51000E+09 .11318E-01 .00000E+00 -.21238E-17
52 .00000E+00 -.26739E-02 .52000E+09 .11548E-01 .00000E+00 -.21607E-17
53 .00000E+00 -.27274E-02 .53000E+09 .11777E-01 .00000E+00 -.22027E-17
54 .00000E+00 -.27810E-02 .54000E+09 .12006E-01 .00000E+00 -.22505E-17
55 .00000E+00 -.28346E-02 .55000E+09 .12235E-01 .00000E+00 -.22767E-17
56 .00000E+00 -.28882E-02 .56000E+09 .12465E-01 .00000E+00 -.23172E-17
57 .00000E+00 -.29419E-02 .57000E+09 .12694E-01 .00000E+00 -.23587E-17
58 .00000E+00 -.29956E-02 .58000E+09 .12924E-01 .00000E+00 -.24121E-17
59 .00000E+00 -.30493E-02 .59000E+09 .13153E-01 .00000E+00 -.24568E-17
60 .00000E+00 -.31031E-02 .60000E+09 .13383E-01 .00000E+00 -.25219E-17
61 .00000E+00 -.31568E-02 .61000E+09 .13612E-01 .00000E+00 -.25445E-17
62 .00000E+00 -.32107E-02 .62000E+09 .13842E-01 .00000E+00 -.25919E-17
63 .00000E+00 -.32645E-02 .63000E+09 .14071E-01 .00000E+00 -.26344E-17
LONGITUDINAL FAILURE IN YARN ID. 9

COMPOSITE FAILED BY LONGITUDINAL YARN FAILURE