
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-HARNES SATIN)
- 4 - 2D BRAIDS (PLAIN, 5/8-HARNES 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

INC	XX STRESS	YY STRAIN	XX STRESS	YY STRAIN	XY STRESS	XY 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

E_{XX} = .45430E+11 E_{YY} = .48654E+11 E_{ZZ} = .10562E+11

Nu_{XY} = .21553 Nu_{YX} = .23083

Nu_{XZ} = .29827 Nu_{YZ} = .25648

G_{XY} = .13181E+11 G_{YZ} = .41450E+10 G_{XZ} = .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

INC	XX STRESS	YY STRAIN	XX STRESS	XY 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