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A NuMAD Model of the Sandia CX-100 Blade

Brian R. Resor and Joshua Paquette

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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Brian R. Resor and Joshua Paquette
Wind Energy Technologies Department
Sandia National Laboratories
P.O. Box 5800
Albuquerque, New Mexico 87185-MS1124

Abstract

This report provides basic documentation of information used to create a CX-100 finite element model using NuMAD. The model is intended for use as a structural model. Use of this model for aerodynamic analyses is to be performed with caution. The CX-100 blade was designed to demonstrate the efficient use of carbon fiber in the spar cap of a wind turbine blade. Refer to the References at the end of this report for full and in-depth information on the CX-100 blade project.

ACKNOWLEDGMENTS

The authors thank the DOE Wind and Water Power Program for the support that was required to produce a blade model and blade modeling approach such as is documented in this report.

Acknowledgement of the teams who executed the Sandia blade programs of the early 2000's is needed. These are the experts who were involved in the design, manufacture, test and documentation of the CX-100, TX-100 and BSDS blade programs: Derek Berry and Steve Nolet of TPI Composites; Dayton Griffin of DNV; Mike Zuteck of MDZ Consulting; Case van Dam of UC-Davis; Kevin Jackson of Dynamic Design; Tom Ashwill, Dale Berg, Henry Dodd, Mark Rumsey, Herb Sutherland, Paul Veers, Jose Zayas of Sandia National Laboratories.

The authors thank Tyler Bushnell, Sandia National Laboratories engineering student employee, for his work in pulling together the references and documentation to produce this report.

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NOMENCLATURE

APDL	Ansys Parametric Dynamic Language
BPE	Beam Property Extraction tool
c	chord length
c_{max}	maximum blade chord
FE	Finite Element
HP	High Pressure
L	blade Length
l/L	fractional spanwise location
LE	Leading Edge
LP	Low Pressure
NuMAD	Numerical Manufacturing and Design tool
TE	Trailing Edge
x/c	distance along airfoil chord

MODELING APPROACH

NuMAD[1] is a MATLAB[2]-based tool developed at Sandia to provide an intuitive interface for defining the outer geometry, shear web locations, materials and stacks, and stack placement in wind turbine blades. The output from NuMAD is a sequence of ANSYS[3] APDL commands used to create the finite element model in ANSYS. Once the model is created, various analyses are used to understand the strength and response of the blade to given loads.

The CX-100 model is based primarily on the intended design of the blade. Layup drawings are included as Appendices in this report. Some material locations were obtained more accurately by actual measurements of a manufactured blade. Material properties used in the model are the same that were used in the design process.

This model has not been calibrated to match blade test data. Due to possible small discrepancies in design versus manufacture, the model represents the intended blade design, but not necessarily the manufactured blade. For example, the weight of the blade model is computed to be about eight percent lower than the actual blade weights.

The model described by this report is meant as a starting point for a validation project or as a tool that can be used for research and engineering studies of blades.

Blade Geometry

The geometry of the blade is based on the ERS-100 blade. There were modifications to the root and the tip of the ERS-100 blade, but no major changes in airfoil shapes were made. The S821, S819, and S820 are used, respectively, for the inboard region (21% to 40%), 70%, and 95% radius[i].

Detailed information on the evolution of the CX-100 blade root and airfoils is found in Reference [4].

[i] Coordinates for S-series airfoils are publicly available through the NREL NWTC webpage. Certain airfoils are patented and may be licensed through NREL. More information on patents and commercial licensing can be found at the following URL: http://wind.nrel.gov/airfoils/AirfoilLicensing.html

Table 1: Baseline Planform Dimensions

Station (mm)[4]	l/L (%)[4]	Chord (m) [4]	Twist (deg) [4]	Chord length represented in model*
200	9.4	0.356	29.6	
600	13.5	0.338	24.8	
1000	17.6	0.569	20.8	0.494
1400	21.7	0.860	17.5	0.772
1800	25.8	1.033	14.7	1.035
2200	30.0	0.969	12.4	
3200	40.3	0.833	8.3	
4200	50.6	0.705	5.8	
5200	60.9	0.582	4.0	X
6200	71.2	0.463	2.7	X
7200	81.5	0.346	1.4	X
8200	91.8	0.232	0.4	
9000	100.0	0.120	0.0	X

*The chord length in the model matches the Baseline Planform Dimensions from Reference [4] for blade locations outboard of 25% span (indicated by X's). The chord length in the model differs slightly from the Baseline Planform Dimensions inboard of 25% span (indicated by as-modeled chord lengths). Blank table entries indicate discrete stations from the Baseline Planform Dimensions table that were not directly included in the blade model.

Aerodynamic Center

Aerodynamic center at each station is assumed to be located at x/c=0.25 and 0.50 for airfoil shapes and for circular shapes, respectively. Values are interpolated in the transition between circular section and airfoil section.

Normalized X-Offset

Normalized x-offset at each station is assumed to be x/c=0.32 and 0.50 for airfoil shapes and for circular shapes, respectively. Values are interpolated in the transition between circular section and airfoil section.

Model Images

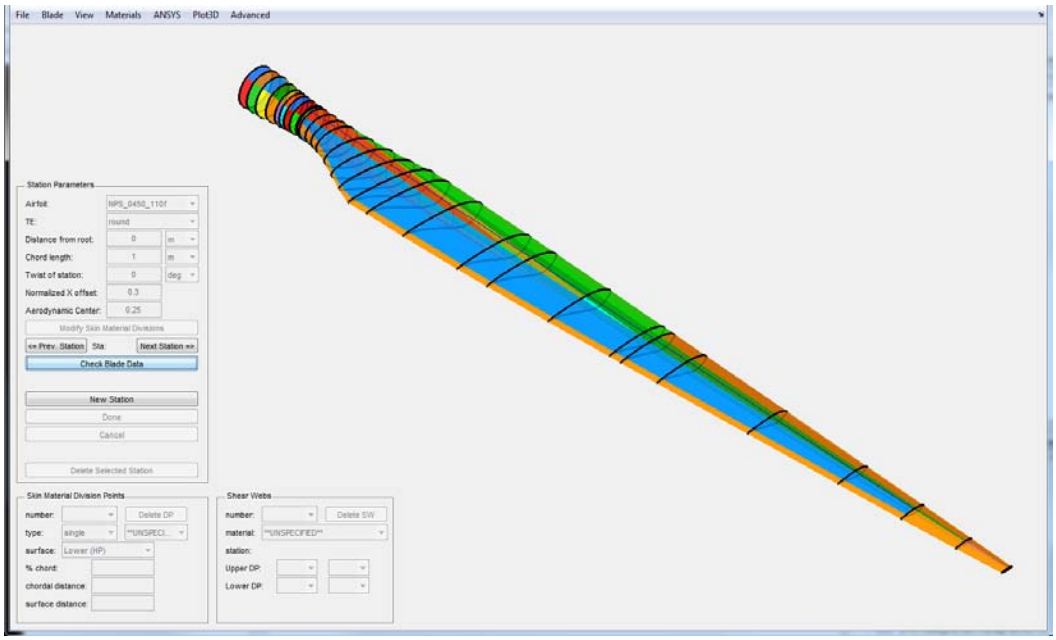


Figure 1: CX-100 model as viewed in NuMAD v2.0.

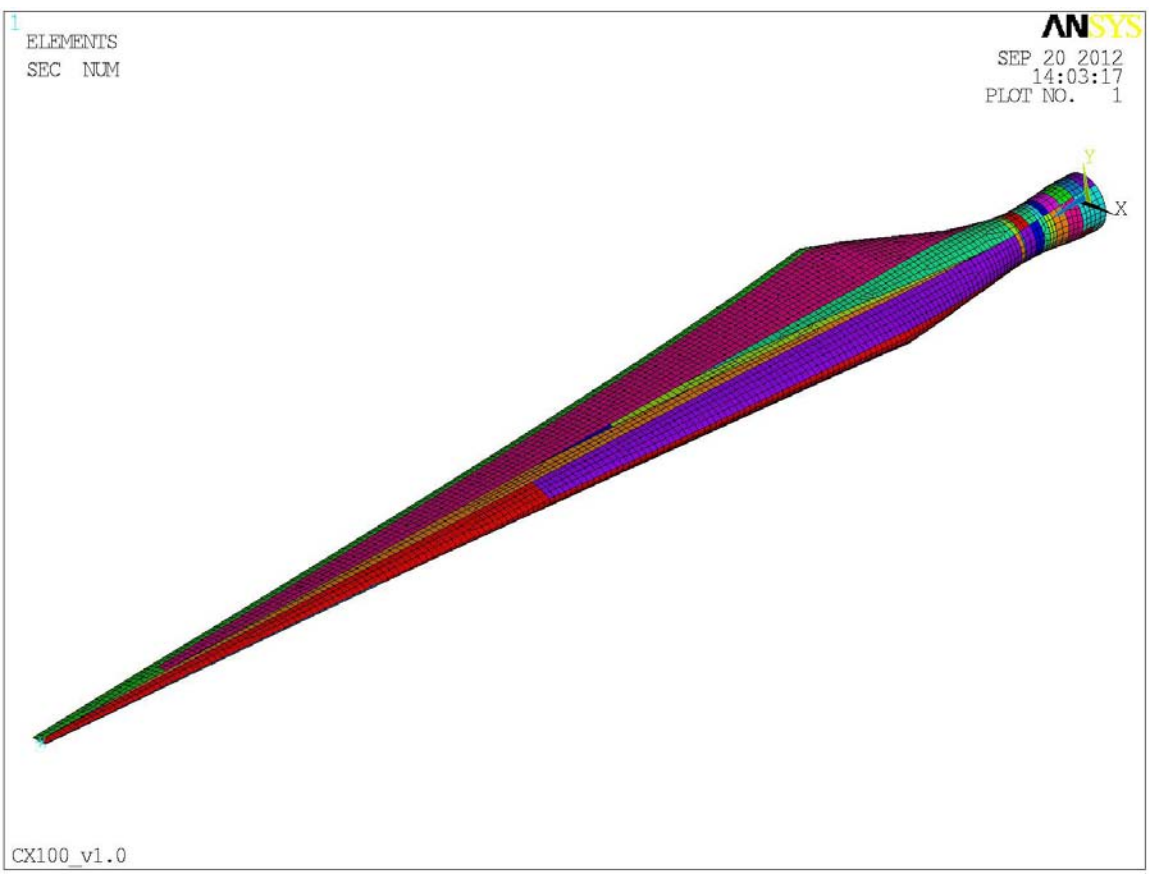


Figure 2: CX-100 blade model in ANSYS.

MATERIALS

The design material properties used in the CX-100 blade design are included in Table 2. Layup drawings for the blade are available in the Appendices of this report.

Table 2: Lamina properties for design calculations; Reference [4]

Material name[4]	Material designation in model	Ex[4] (GPa)	Ey[4] (GPa)	Gxy[4] (GPa)	Nuxy[4] (actual model values)	Density[4] (kg/m^3) (actual model values)	Ply thickness[4]		Ply thickness in model
							(in)	(mm)	(mm)
Gel coat	gel_coat	3.44	3.44	1.38	0.30	1235 (1230)	0.005	0.13	0.13
Fill epoxy	(Not used)	2.41	2.41	0.96	0.30	1154	0.020	0.51	
Plexus	(Not used)	0.31	0.31	0.14	0.30	962			
Random mat	Mat	7.58	7.58	4.00	0.30	1678 (1687)	0.015	0.38	0.38
End-grain balsa	Balsa	0.12	0.12	0.02	0.30	230	0.250	6.35	6.4*
DBM1708 (+/- 45-deg fiberglass)	DBM1708	9.58	9.58	6.89	0.39	1814	0.035	0.89	0.89*
DBM1208 (+/- 45-deg fiberglass)	DBM1708	9.58	9.58	6.89	0.39	1814	0.022	0.56	0.5, 0.56*
C520 (0-deg fiberglass)	C520	37.30	7.60	6.89	0.31	1874	0.052	1.32	2.6, 3.0, 4.0, 4.6*
0-deg Carbon, 500gsm	(Not used)	105.40	6.82	3.32	0.28	1480	0.030	0.63	
Carbon-fiberglass triaxial fabric	CX100_hybrid_triax	84.10	8.76	4.38	0.21 (0.25)	1560 (3469)	0.030	0.63	3.3, 4.4*

*Ply thicknesses in the model differ from what was used in the design calculations for one of two reasons: 1) model values are based on actual measurement of as-manufactured ply thicknesses or 2) model layers may represent the combination of one or more actual layers.

Measured Material Properties

Mechanical tests were performed in order to determine the as-built mechanical material properties for the blade materials. The test-derived values have not been included in the model here, but the results of those tests are included in the TX-100 report[5] as Appendix A.

Material Layup

Drawings for manufacture of this blade are included in Appendices A-C of this report.

The model is based primarily on these drawings but is supplemented with actual measurements of a manufactured blade.

Blade Root Hardware

Blade root hardware is not included in this model of the CX-100 blade.

Leading Edge Alterations

The leading edge has some alterations to the material to avoid shell element errors in ANSYS while using 8-noded shells (i.e. SHELL281). Leading edge material composites were renamed with a modifying tag: "_x10". The modification indicates that a material in composite was made ten times as strong, stiff, and dense, and one tenth the thickness. This modification has been done in small areas along leading edge.

Sharp Element Alterations

When modeling the blade after the 'as-built' CX-100, structural analysis runs into problems with two excessively sharp areas on the blade. These areas have been changed into quadrilateral shapes to make ANSYS analysis possible at the cost of only minor model accuracy.

BLADE MODEL ARCHIVE FILES

NuMAD Project Files

The following files are located in the CX-100 blade model folder, *CX100_v1.0:*

CX100_v1.0.nmd
The NuMAD blade model data file. This file is for use with NuMAD v2.0.

MatDBsi.txt
The NuMAD material data file.

shell7.src
Output from NuMAD. This file contains the APDL commands that are used directly in ANSYS to create the CX-100 shell element model using the command string "/INPUT,shell7,src" at the ANSYS command input.

zAirfoil.mac, zFlatback.mac, zSmoothe.mac
These are ANSYS macro files that are required to execute the commands found in the *shell7.src* file. These macros must remain in the same folder as the shell7 file when the ANSYS input execution is performed.

'Airfoils' Folder

Following is a list of the airfoil shape files found in the CX-100 *airfoils* folder:

CXTX_0400_110.txt	CXTX_1800_110f.txt
CXTX_0450_110f.txt	CXTX_2000_110.txt
CXTX_0500_110f.txt	CXTX_2400_110.txt
CXTX_0570_110f.txt	CXTX_3000_110.txt
CXTX_0653_110f.txt	CXTX_3400_110.txt
CXTX_0667_110f.txt	CXTX_4000_110.txt
CXTX_0700_110f.txt	CXTX_4600_110.txt
CXTX_0800_110f.txt	CXTX_4800_110.txt
CXTX_0900_110f.txt	CXTX_5200_110.txt
CXTX_1000_110f.txt	CXTX_6200_110.txt
CXTX_1200_110f.txt	CXTX_7200_110.txt
CXTX_1400_110f.txt	CXTX_7800_110.txt
CXTX_1600_110f.txt	CXTX_8200_110.txt

EXAMPLE ANALYSES

Following are results from basic analyses. These results can be used as a baseline for comparison if the user needs to check the validity of their model against the original archive files.

Mesh Size

The global element size (AESIZE setting in ANSYS) is set to 0.05 meters.

Model Mass

The overall model mass is 160.41 kg, as calculated by ANSYS. The spanwise location of the blade center of mass is at 2.3085 meters.

Based on actual measurements of the first series of production blades[6], the weight of the average as-built CX-100 blade is 173.7 kg and the spanwise location of the blade center of mass is at 2.287 meters.

Based on actual measurements of more CX-100 blades up to 2008, the weight of the average as-built CX-100 blade is 173.2 kg and the spanwise location of the blade center of mass is at 2.304 meters.

Modal Analysis

A cantilevered modal analysis of the CX-100 ANSYS model is performed. The Block Lanczos solver is used to find six modes.

Table 3: Results from an ANSYS modal analysis.

Mode	Frequency (Hz)	Shape
1	4.1778	1st flapwise bending
2	5.2142	1st edgewise bending
3	11.412	2nd flapwise bending
4	17.553	2nd edgewise bending
5	21.579	3rd flapwise bending
6	31.625	Flapwise bending & torsion

Static Analysis

A cantilevered static analysis was performed on the CX-100 ANSYS model, using a flapwise (t-direction) 1000 N pull on the tip of the blade. Results were processed using the material coordinate system (RSYS,SOLU) and mid-thickness results (SHELL, MIDDLE). Shown is the elastic strain in the material x-direction, or blade spanwise direction. Maximum tip displacement computed with this analysis is 0.459554 meters.

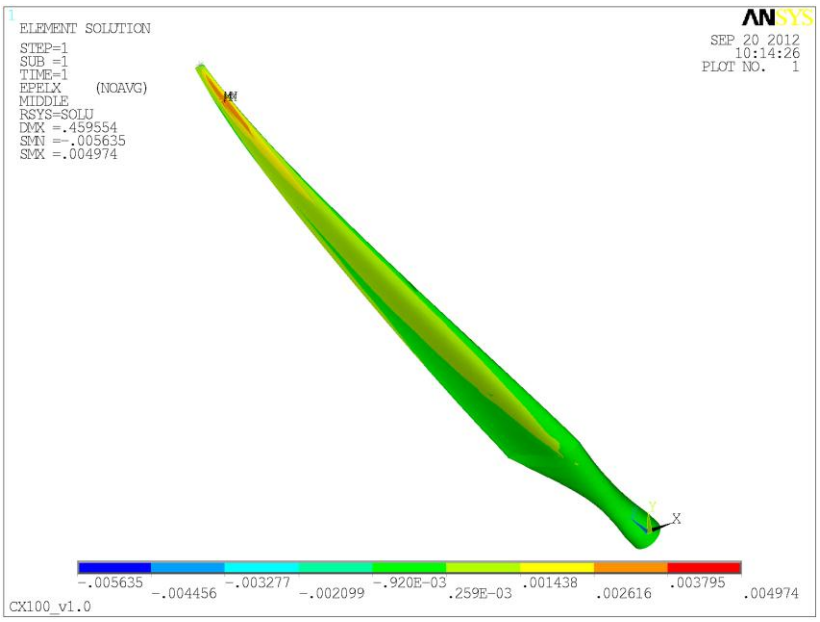


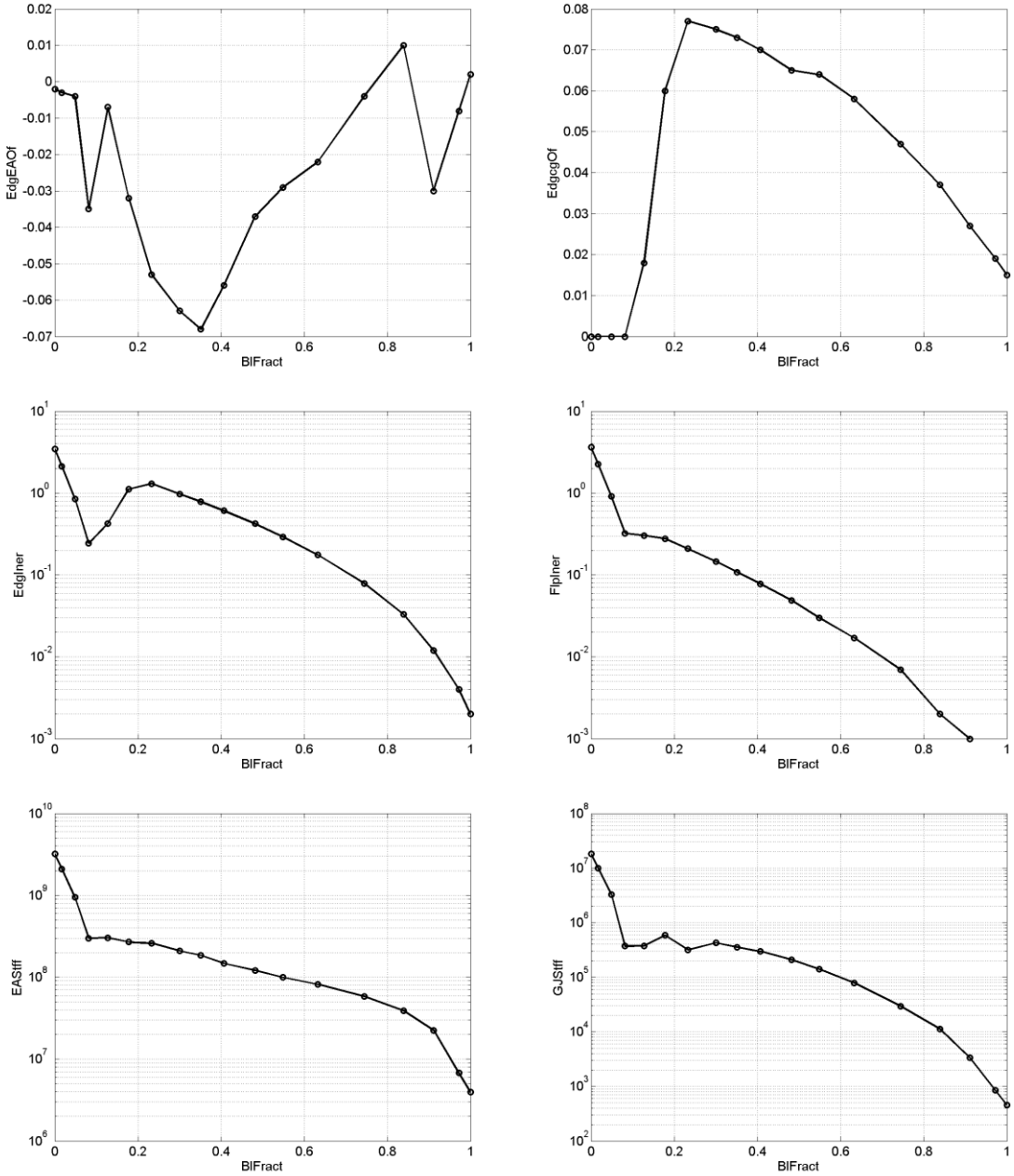
Figure 3: A plot of the composite material x-direction strain resulting from a static analysis of the CX-100 blade; view of HP surface is shown.

PreComp Analysis

NuMAD v2.0 provides the capability to use PreComp[7] to compute sectional properties of the blade based on the information contained in the NuMAD blade model. The NuMAD-to-PreComp capability requires the presence of LE material division points at all stations in the model. Currently the CX-100 model is not set up to be compatible with this requirement.

BPE Analysis

BPE is an approach used to compute equivalent section properties of the three-dimensional blade model using an inverse approach[8]. Following are the blade cross section property distributions computed using BPE:


EdgEAOf
BlFract
EdgcgOf
BlFract
EdgIner
BlFract
FlpIner
BlFract
EAStiff
BlFract
GJStiff
BlFract

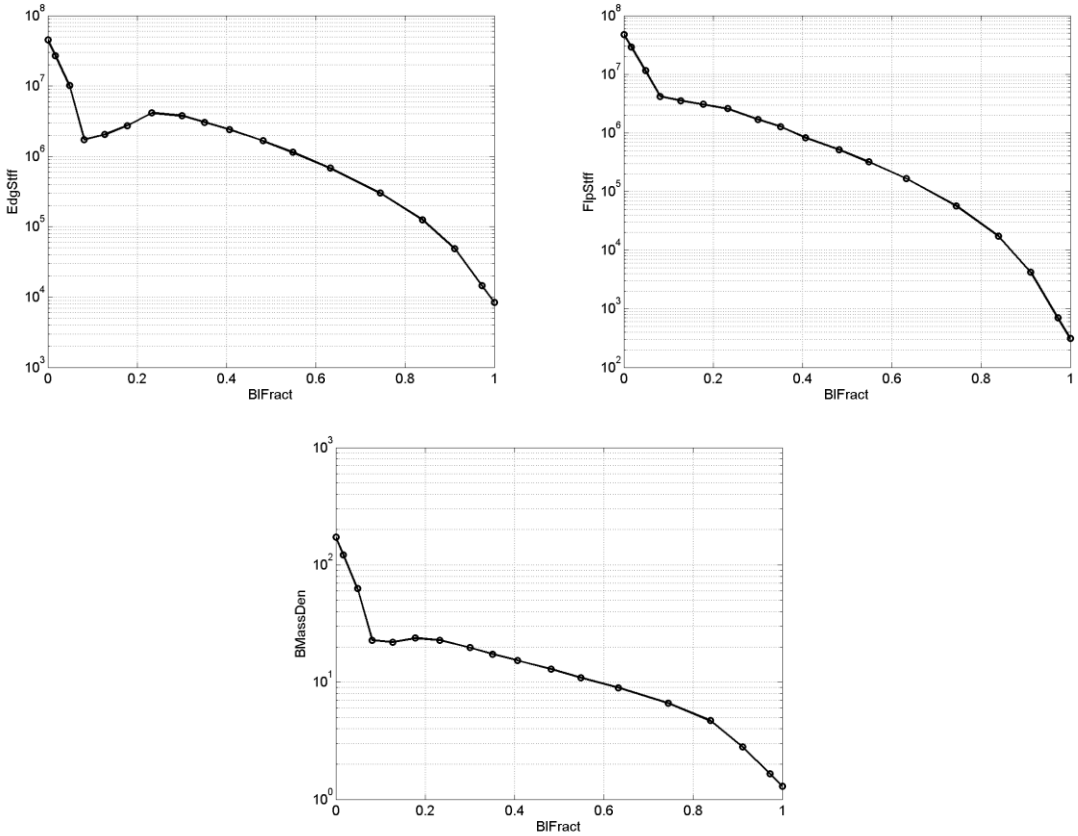


Figure 4: Equivalent section properties computed using BPE; parameters definitions are consistent with FAST blade input file inputs.

ADDITIONAL CX-100 BLADE RESOURCES

J.R. Zayas, P.L. Jones, A. Holman "CX-100 and TX-100 Blade Field Tests" SAND05-7454 http://prod.sandia.gov/techlib/access-control.cgi/2005/057454.pdf

J. Paquette, J. van Dam and S. Hughes. "Structural Testing of 9 m Carbon Fiber Wind Turbine Research Blades." Conference Paper NREL/CP-500-40985. January 2007. http://www.nrel.gov/wind/pdfs/40985.pdf

D. Todd Griffith, Gregory Smith, Miguel Casias, Sarah Reese and Todd W. Simmermacher. "Modal Testing of the TX-100 Wind Turbine Blade." Sandia Report SAND05-6454. Printed March 2006. http://prod.sandia.gov/techlib/access-control.cgi/2005/056454.pdf

Berry, Derek and Ashwill, T. "TX-100 Manufacturing Final Project Report." Sandia Report SAND2007-6066. Printed November 2007. http://prod.sandia.gov/techlib/access-control.cgi/2007/076066.pdf

Paquette, J.A., Veers, P. "Increased Strength in Wind Turbine Blades through Innovative Structural Design" EWEC Presentation 2007, Milan, Italy. http://www.nmsea.org/Solar_Fiesta/Solar_Fiesta_2007/Solar_Fiesta_Presentations/Increased_Strength_Wind_Turbine_Blades.pdf

Paquette, Laird, Griffith and Rip. "Modeling and Testing of 9m Research Blades." Proceedings of the AIAA Aerosciences Meeting, 2006. http://www.sandia.gov/wind/asme/AIAA-2006-Modeling9m.pdf

CITED REFERENCES

[1] Jonathan C. Berg and Brian R. Resor, "Numerical Manufacturing And Design Tool (NuMAD v2.0) for Wind Turbine Blades: User's Guide." Sandia National Laboratories SAND Report SAND2012-7028. http://energy.sandia.gov/?page_id=2238

[2] Mathworks Matlab. Natick, Massachusetts. https://www.mathworks.com/

[3] ANSYS Inc., Canonsburg, PA 15317, http://www.ansys.com

[4] D. Berry, T. Ashwill "Design of 9-Meter Carbon-Fiberglass Prototype Blades: CX-100 and TX-100" SAND07-0201 http://infoserve.sandia.gov/sand_doc/2007/070201.pdf

[5] B. Resor and J. Paquette. "A NuMAD Model of the Sandia TX-100 Blade." Sandia National Laboratories Report SAND2012-9274.

[6] D. Berry, T. Ashwill "CX-100 Manufacturing Final Project Report" SAND07-6065 http://windpower.sandia.gov/other/076065.pdf

[7] NWTC Design Codes (PreComp by Rick Damiani). http://wind.nrel.gov/designcodes/preprocessors/precomp/. Last modified 28-June-2012; accessed 28-June-2012.

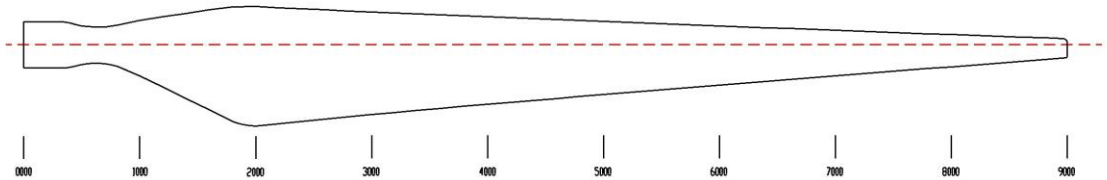
[8] Malcolm, D. J. & Laird, D. L. Extraction of Equivalent Beam Properties from Blade Models. *Wind Energy*, 2007, 10, 135-137.

APPENDIX A: CX-100 LAYUP DRAWINGS – HP SKIN

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

CX-100
9 METER WINDBLADE



LAMINATE SCHEDULE
HIGH PRESSURE (HP) SKIN
REV C

NOTE: ALL DIMENSIONS HAVE A TOLERANCE OF ±10MM

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
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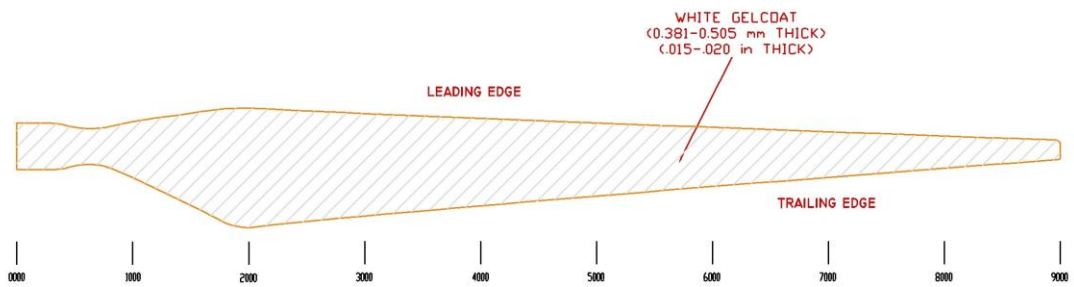
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER I:

- MASK THE FLANGES OF THE MOLD TO AVOIS OVERSPRAY
- SPRAY WHITE GELCOAT OVER ENTIRE SURFACE AS SHOWN
- THICKNESS AFTER SPRAYING SHOULD BE 0.381-0.508 MM (0.015"-0.020")
- ALLOW GEL COAT TO AIR DRY

NO.	PART NO.	DESCRIPTION	QTY
1	46508	GELCOAT, SPORT WHITE, 953-WA411 (LB)	10.0

PARTS LIST

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.X	.XX	.XXX	ANGLES
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ALL DIMENSIONS IN mm

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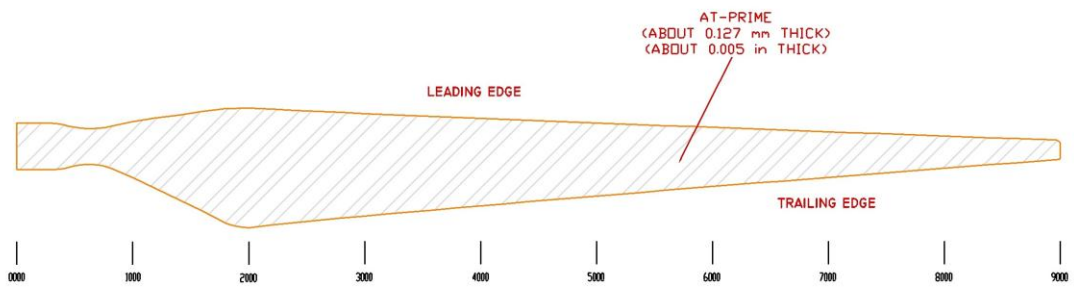
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 2:

- ROLL AT-PRIME OVER ENTIRE SURFACE AS SHOWN
- THICKNESS AFTER ROLLING SHOULD BE 0.381-0.508 MM (0.015"-0.020")
- ALLOW AT-PRIME TO AIR DRY

NO.	PART NO.	DESCRIPTION	QTY
1	46110	AT-PRIME ADHESION, PARTS A AND B (LB)	10.0

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

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MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

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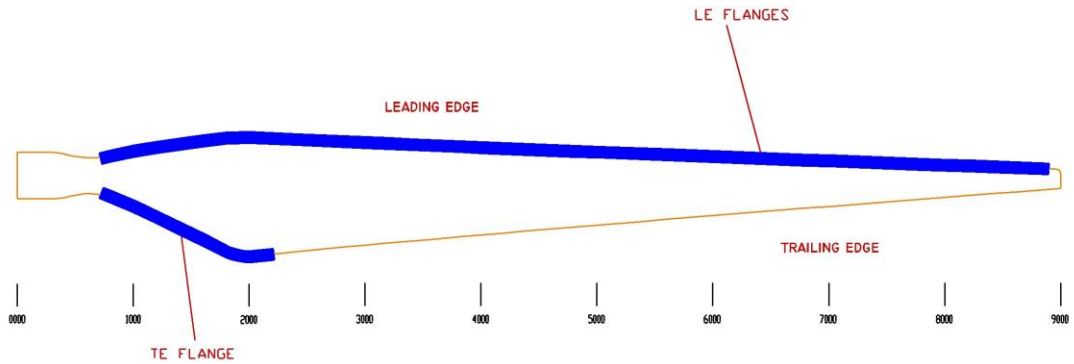
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



INSTALL RETURN FLANGES:

- INSTALL THE RETURN FLANGES ON THE MOLD
- ENSURE ALL FLANGES ARE IN THE CORRECT LOCATION BY MATCHING THE FLANGE NOTATION TO THE MOLD NOTATION
- WAX THE FLANGES TO ALLOW FOR PROPER RELEASE
- ENSURE ALL FASTENERS ARE HAND TIGHT
- (NOTE: IT MAY BE NECESSARY TO LEAVE SOME OF THE FLANGES LOOSE TO FIT FABRIC UNDER - THIGHTEN THE FLANGES BEFORE APPLYING THE VACUUM BAG)

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

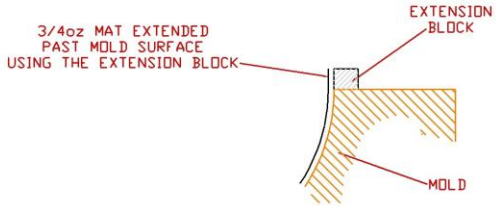
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

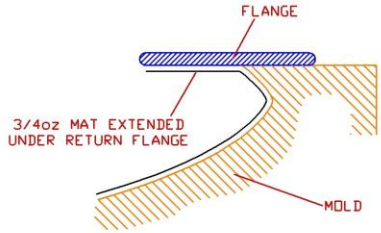
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

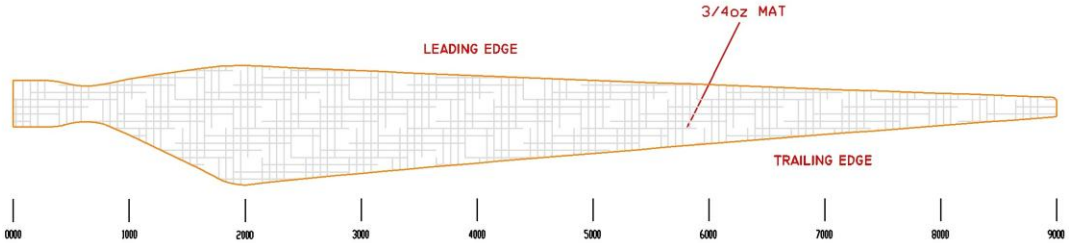
DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 3:

- APPLY 3/4oz MAT TO THE ENTIRE SURFACE OF THE MOLD
- BRING THE MAT UP UNDER THE RETURN FLANGES IN ALL LOCATIONS
- BRING MAT ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS

NO.	PART NO.	DESCRIPTION		QTY
1	46051	3/4oz MAT	(LB)	3

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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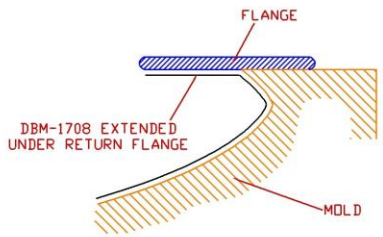
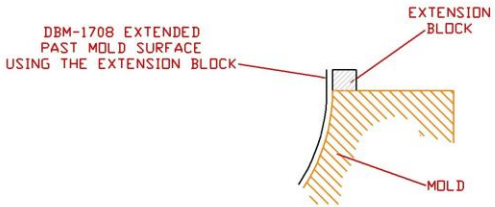
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

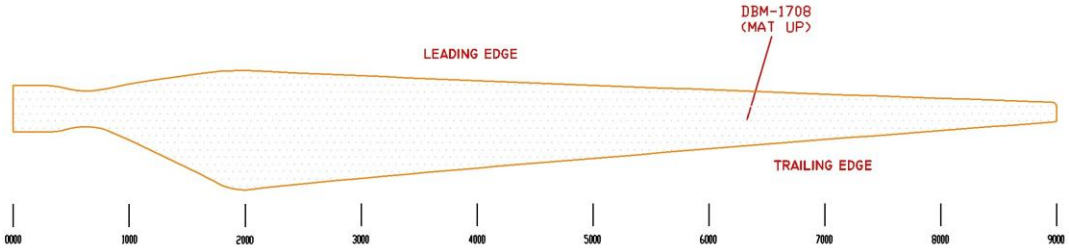
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 4:

- APPLY DBM-1708 TO THE ENTIRE SURFACE OF THE MOLD - PLACE MAT UP
- BRING THE GLASS UP UNDER THE RETURN FLANGES IN ALL LOCATIONS
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	11

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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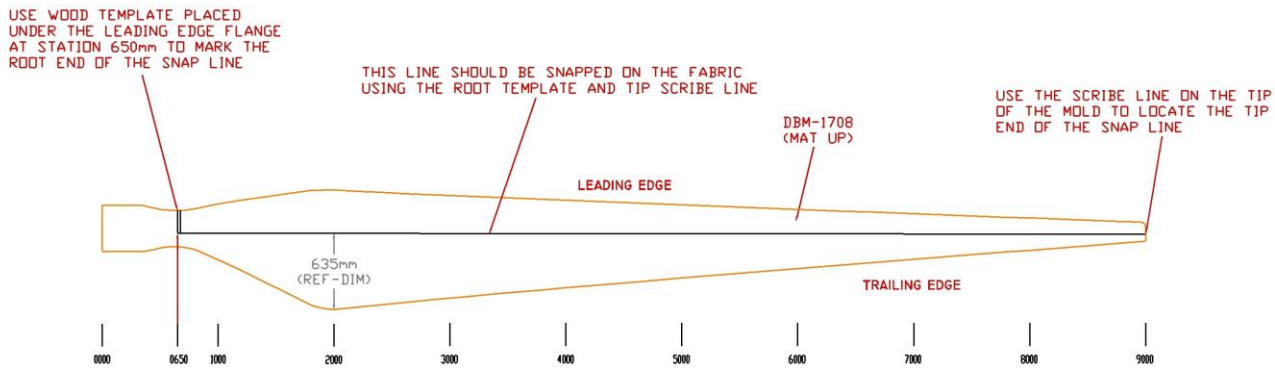
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



CENTER LINE SNAP:

- SNAP A CHALK LINE ON THE DBM-1708
- USE THE WOOD HP TEMPLATE UP UNDER THE LE FLANGE AT STATION 650 TO MARK THE ROOT END OF THE SNAP LINE
- USE THE SCRIBE LINE ON THE MOLD AT THE TIP TO MARK THE TIP END OF THE SNAP LINE (THE SCRIBED MARK SHOULD BE 65MM FROM THE TE AT 9M)
- AS A CHECK, THE RESULTING LINE SHOULD BE 635MM FROM THE TE AT STATION 2M (FOLLOW THE CONTOUR OF THE MOLD WHILE MEASURING)

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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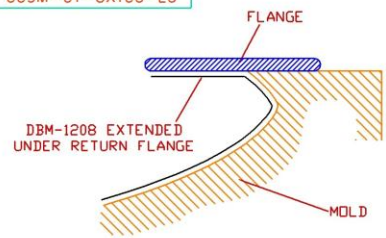
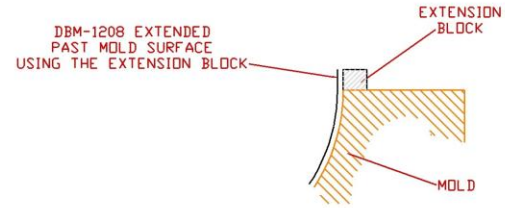
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

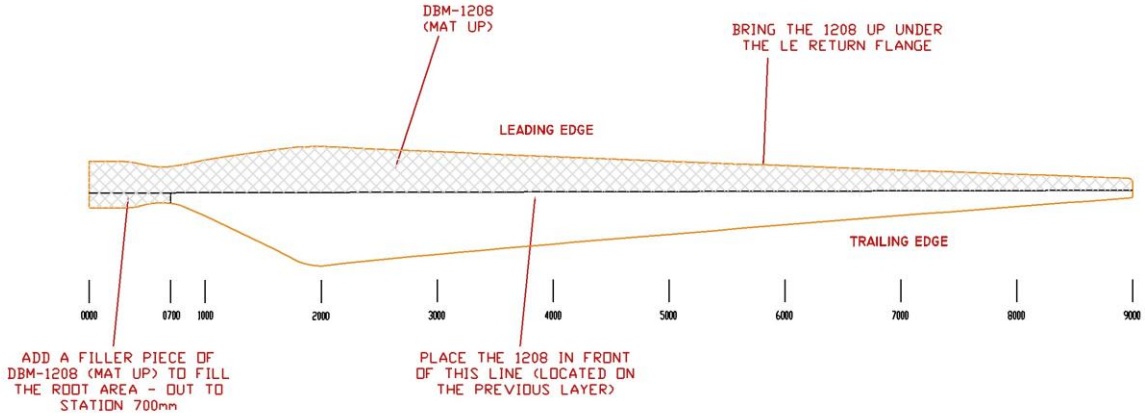
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 5:

- APPLY DBM-1208 TO THE AREA SHOWN ABOVE - PLACE THE 1208 ALONG AND IN FRONT OF THE LINE ON THE PREVIOUS LAYER
- ADD A FILLER PATCH OF DBM-1208 TO FILL THE ROOT AREA - OUT TO 700MM
- BRING THE GLASS UP UNDER THE RETURN FLANGES ALONG THE LEADING EDGE
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS
- PLACE THE DBM-1208 MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	5

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED: MACHINED SURFACE FINISHES 125√ MACHINED FILLET RADII .015-.030

THIRD ANGLE

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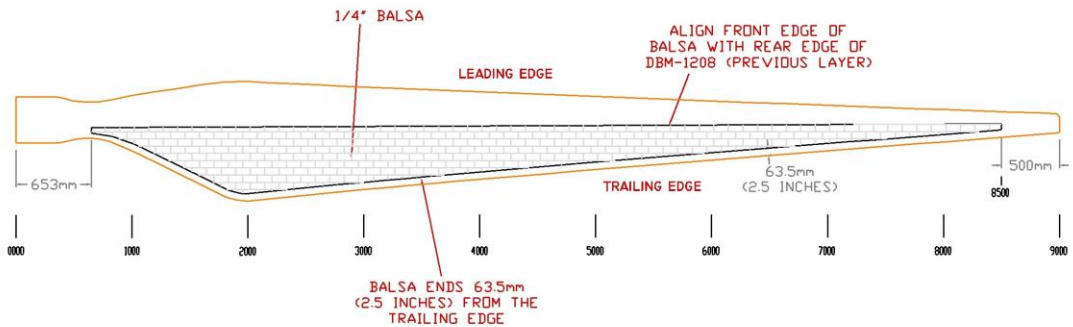
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
SCALE: NONE
SHT: 1 OF 1
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 6:

- APPLY 1/4" BALSA TO THE AREA SHOWN ABOVE
- USE THE HP TE BALSA TEMPLATE TO CUT THE SHAPE
- BUTT THE FRONT EDGE ALONG THE REAR EDGE OF THE PREVIOUS LAYER (DBM-1208)
- THE BALSA SHOULD START AT 653 MM FROM THE ROOT
- THE BALSA SHOULD STOP 63.5MM (2.5 INCHES) FROM THE TE
- THE BALSA SHOULD TERMINATE 500MM FROM THE TIP (STA 8500)

NO.	PART NO.	DESCRIPTION		QTY
1	46015	BALSA, 1/4"	(SF)	22

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100

TITLE: HP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV: C

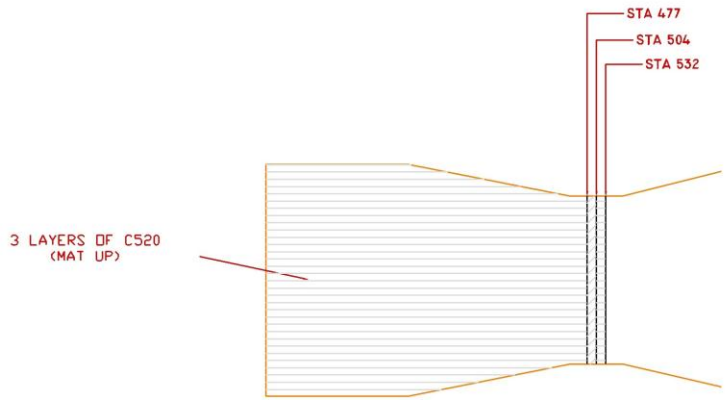
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

FILE: Lam_CX100_HP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

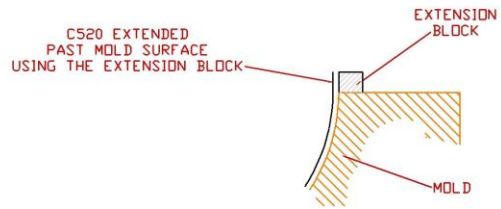


LAY DOWN IN THIS ORDER:

FIRST: LAYER #7 - 477MM

SECOND: LAYER #8 - 504MM

THIRD: LAYER #9 - 532MM



LAYERS 7-8-9:

- APPLY 3 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 477, 504 AND 532
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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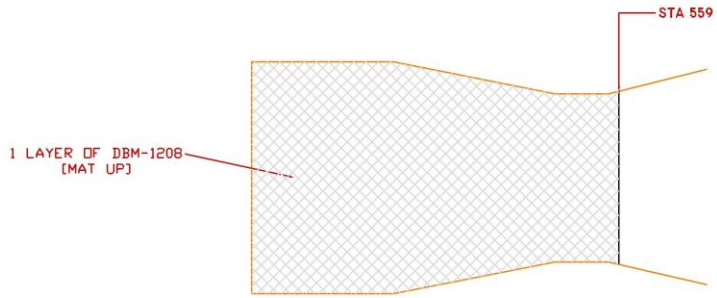
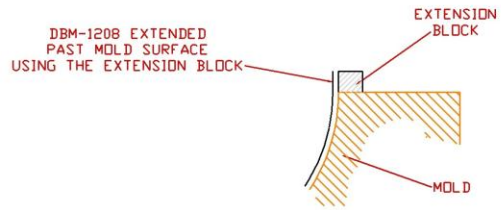
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 10:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 559
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
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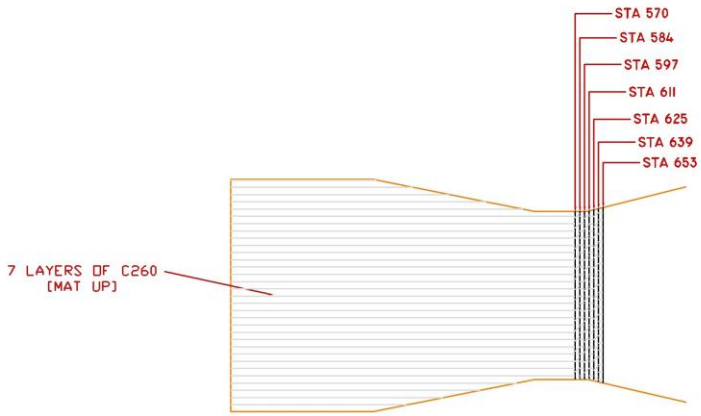


LAY DOWN IN THIS ORDER:

FIRST: LAYER #11 - 570MM

SECOND: LAYER #12 - 584MM

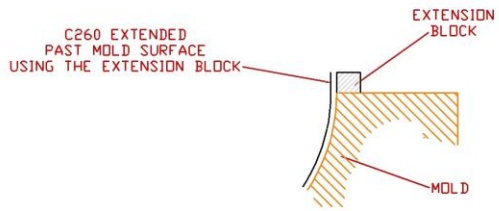
THIRD: LAYER #13 - 597MM

FOURTH: LAYER #14 - 611MM

FIFTH: LAYER #15 - 625MM

SIXTH: LAYER #16 - 639MM

SEVENTH: LAYER #17 - 653MM



LAYERS 11-12-13-14-15-16-17:

- APPLY 7 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 570, 584, 597, 611, 625, 639 AND 653
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100

TITLE: HP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV C

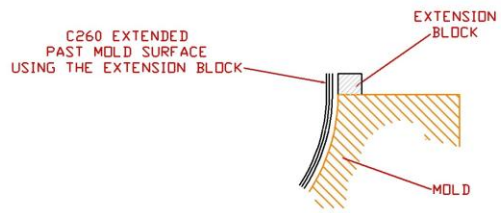
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

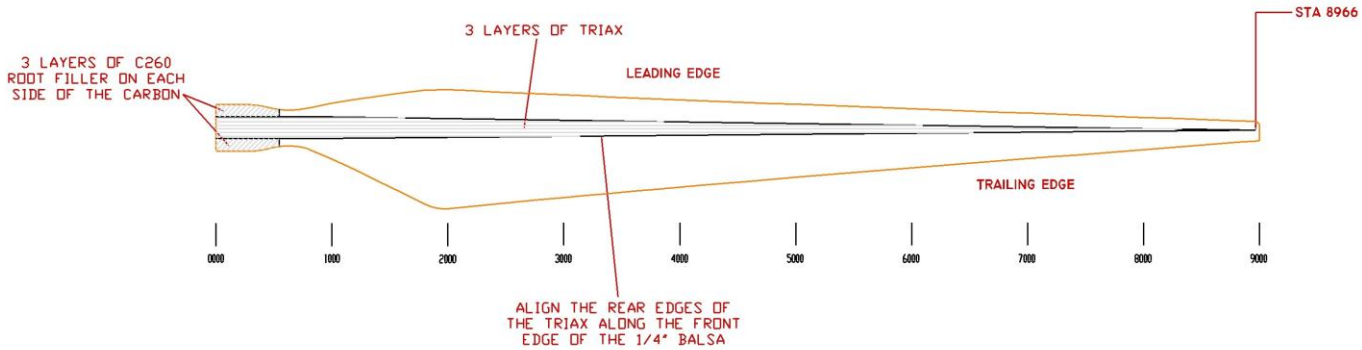
FILE: Lam_CX100_HP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYERS 18-19-20:

- APPLY 3 LAYERS SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGES ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THESE TRIAX LAYERS WILL COME TO A POINT AT STA 8966
- INSERT 3 LAYERS OF C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

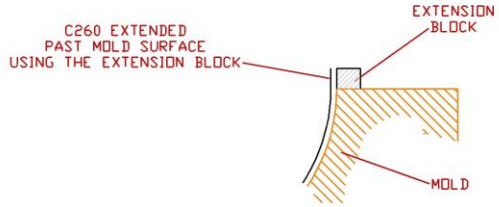
DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

LAY DOWN IN THIS ORDER:

FIRST: LAYER #21 - 474MM

SECOND: LAYER #22 - 458MM



LAYERS 21-22:

- APPLY 2 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 474 AND 458
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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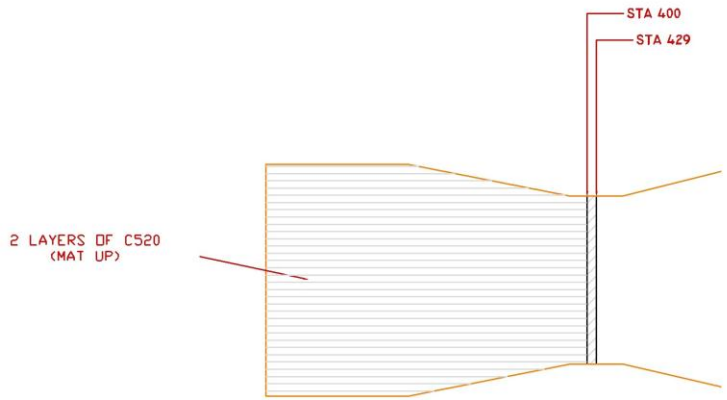
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

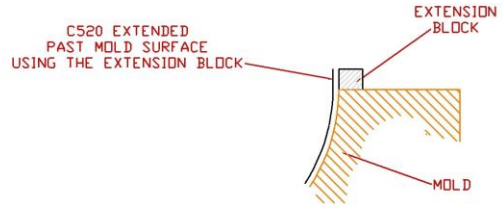
REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #23 - 429MM

SECOND: LAYER #24 - 400MM



LAYERS 23-24:

- APPLY 2 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 429 AND 400
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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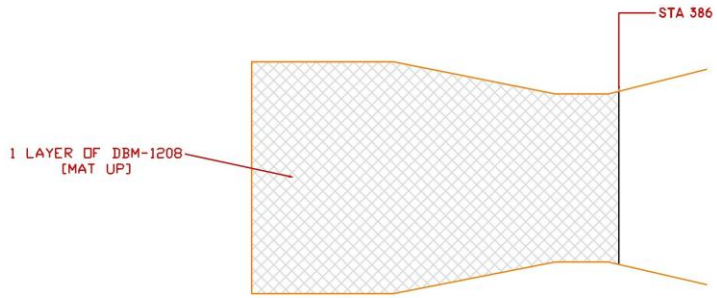
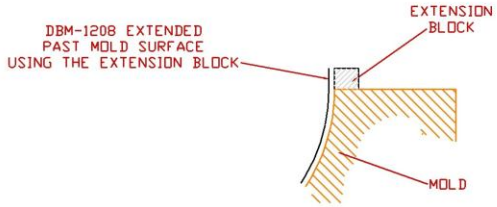
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 25:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 386
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

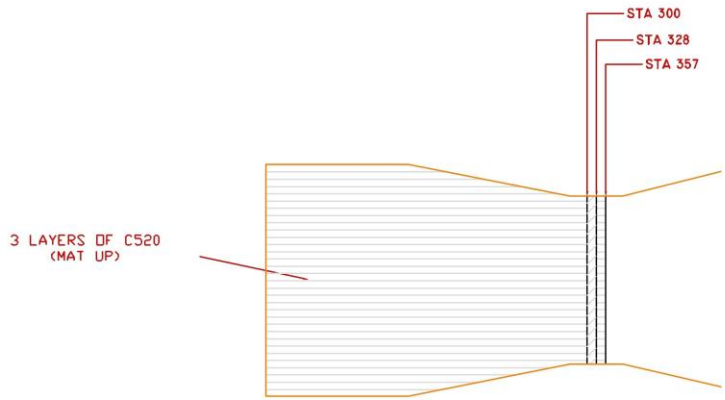
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

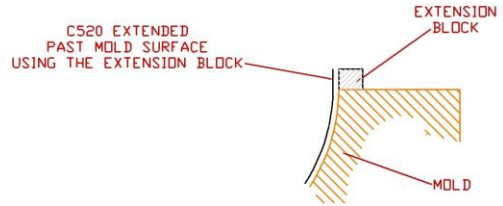


LAY DOWN IN THIS ORDER:

FIRST: LAYER #26 - 357MM

SECOND: LAYER #27 - 328MM

THIRD: LAYER #28 - 300MM



LAYERS 26-27-28:

- APPLY 3 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 357, 328 AND 300
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100

TITLE: HP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV: C

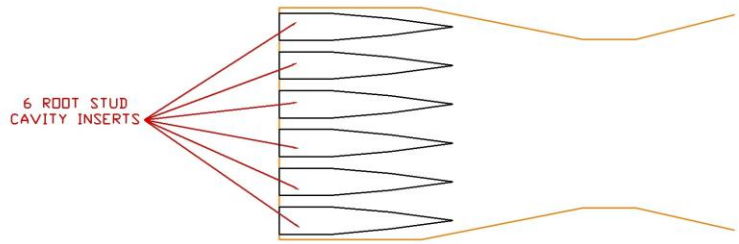
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

FILE: Lam_CX100_HP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 29:

- INSTALL THE SIX ROOT STUD CAVITY INSERTS
- ENSURE THE INSERTS ARE WELL WAXED
- ENSURE THE BOLTS ARE TIGHTENED TO ORIENT THE INSERT PERPENDICULAR TO THE END PLATE - THIS WILL COMPRESS THE FABRIC BELOW THE INSERTS

NO.	PART NO.	DESCRIPTION	QTY
1	85006	ROOT STUD, 3/4-16 (EA)	6

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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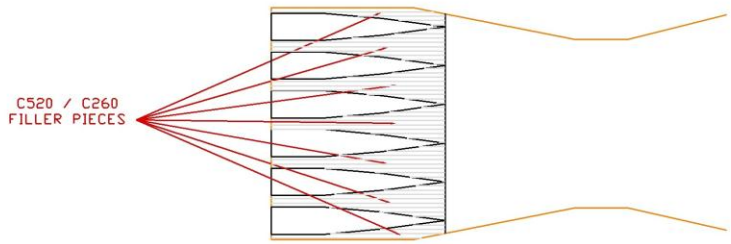
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 30:

- INSTALL C520 AND/OR C260 STRIPS BETWEEN THE ROOT STUD CAVITIES TO FILL THE GAPS UP TO THE LEVEL OF THE TOP OF THE CAVITIES
- SCRAP PIECES OF C520 AND C260 MAY BE USED FOR THIS STEP

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

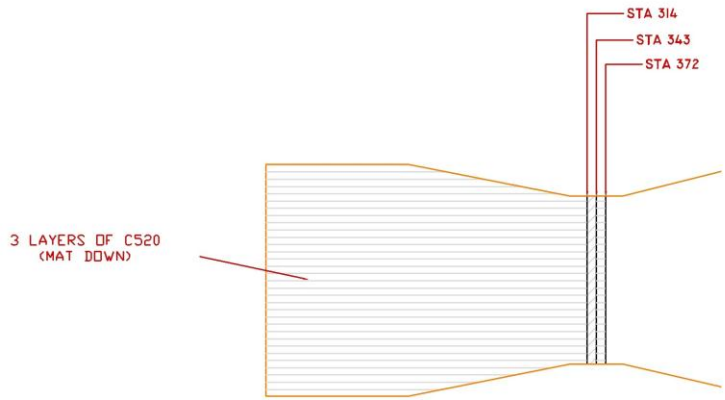
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

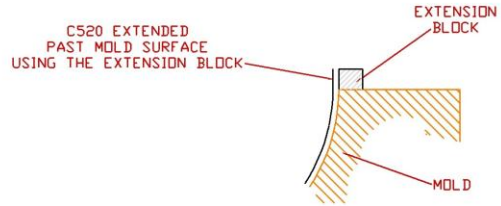


LAY DOWN IN THIS ORDER:

FIRST: LAYER #31 - 314MM

SECOND: LAYER #32 - 343MM

THIRD: LAYER #33 - 372MM



LAYERS 31-32-33:

- APPLY 3 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 314, 343 AND 372
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100

TITLE: HP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO.: SNL-009M-01-CX100-L0 | REV: C

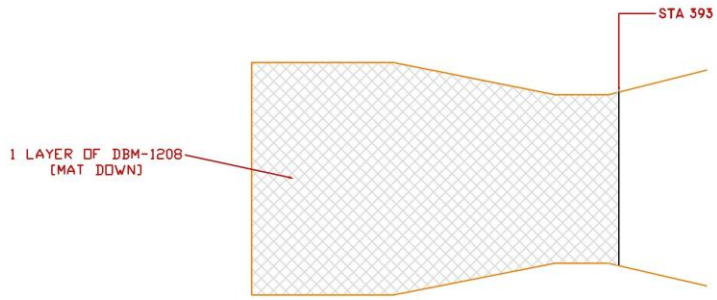
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

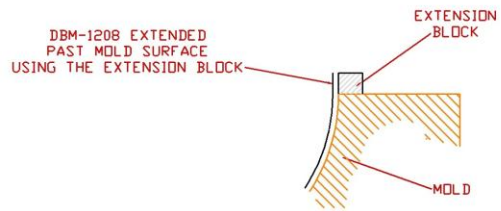
FILE: Lam_CX100_HP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 34:

- APPLY 1 LAYERS DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 393
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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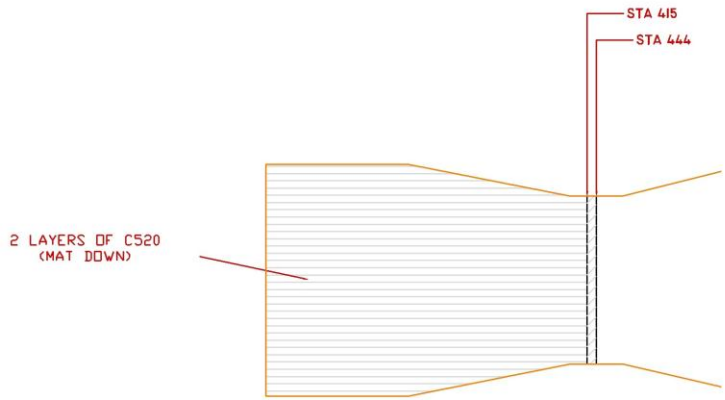
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

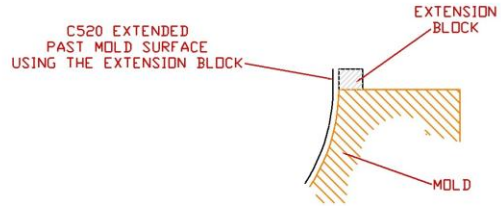
REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #35 - 415MM

SECOND: LAYER #36 - 444MM



LAYERS 35-36:

- APPLY 2 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 415 AND 444
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

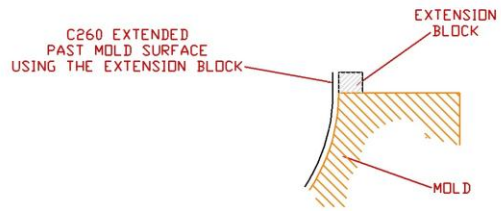
DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

LAY DOWN IN THIS ORDER:

FIRST: LAYER #37 - 466MM

SECOND: LAYER #38 - 481MM



LAYERS 37-38:

- APPLY 2 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 466 AND 481
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100

TITLE: HP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV C

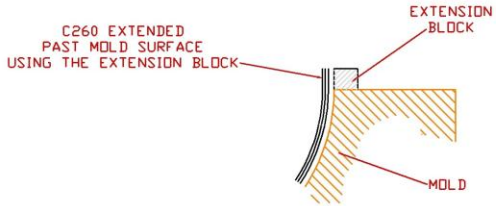
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

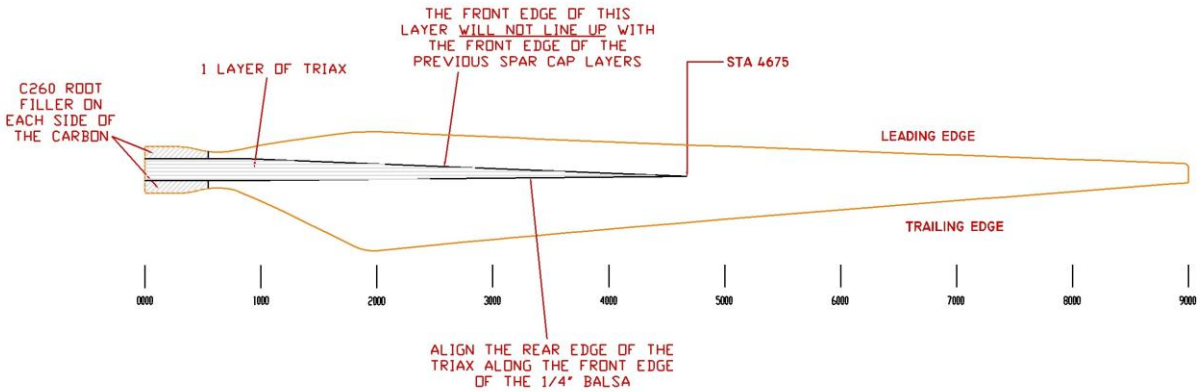
FILE: Lam_CX100_HP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 39:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 4675
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
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.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

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MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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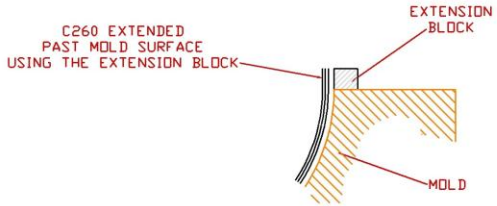
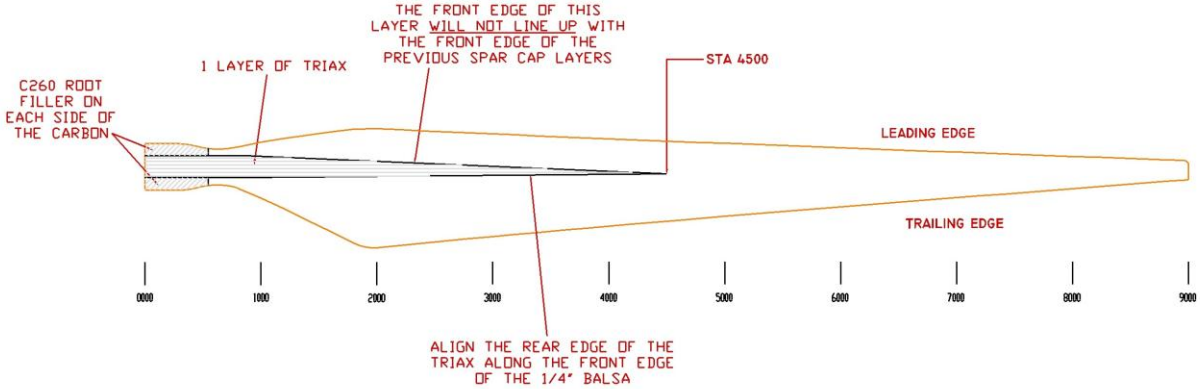
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 40:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 4500
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
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TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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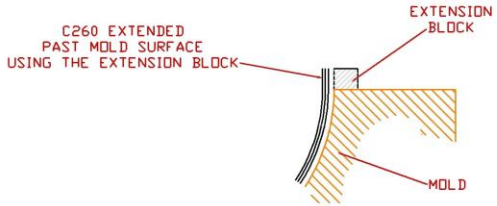
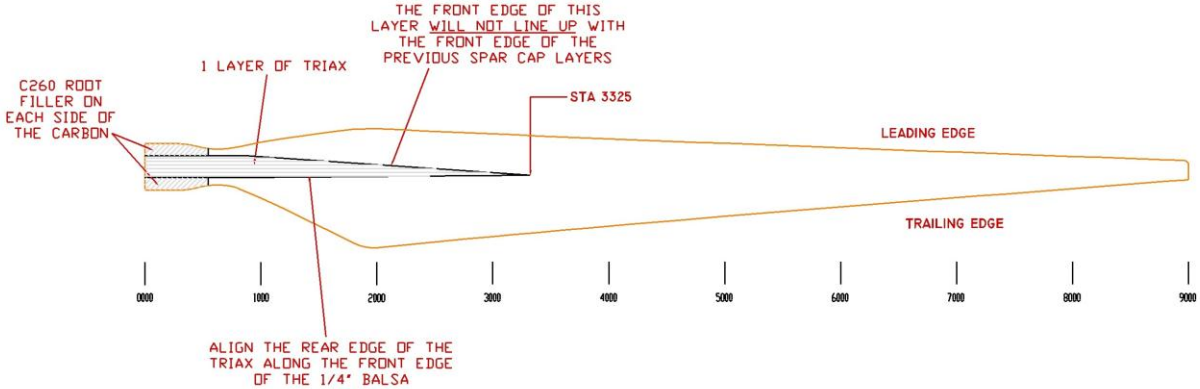
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 41:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 3325
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

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MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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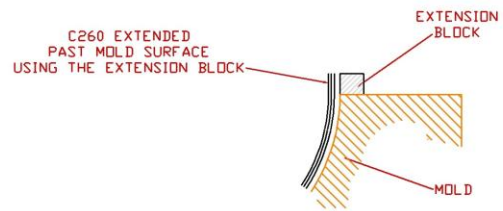
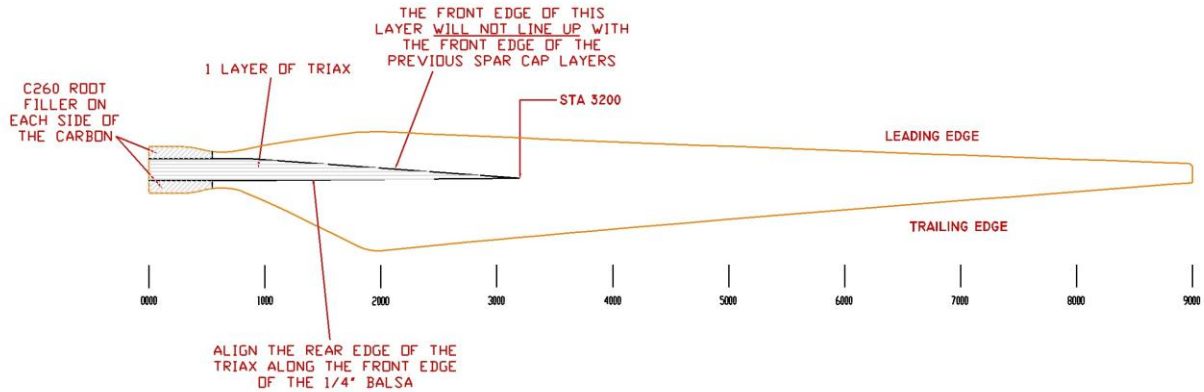
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 42:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 3200
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
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TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

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MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

LAY DOWN IN THIS ORDER:

FIRST: LAYER #43 - 653MM

SECOND: LAYER #44 - 639MM

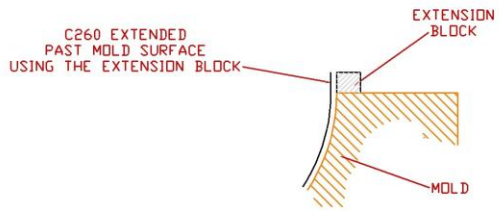
THIRD: LAYER #45 - 625MM

FOURTH: LAYER #46 - 611MM

FIFTH: LAYER #47 - 597MM

SIXTH: LAYER #48 - 584MM

SEVENTH: LAYER #49 - 570MM



LAYERS 43-44-45-46-47-48-49:

- APPLY 7 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 653, 639, 625, 611, 597, 584 AND 570
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
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MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100

TITLE: HP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV C

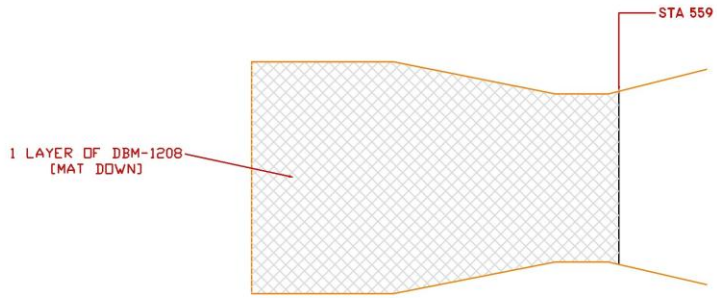
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

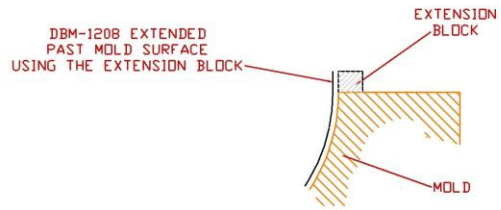
FILE: Lam_CX100_HP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 50:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 559
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
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.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

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MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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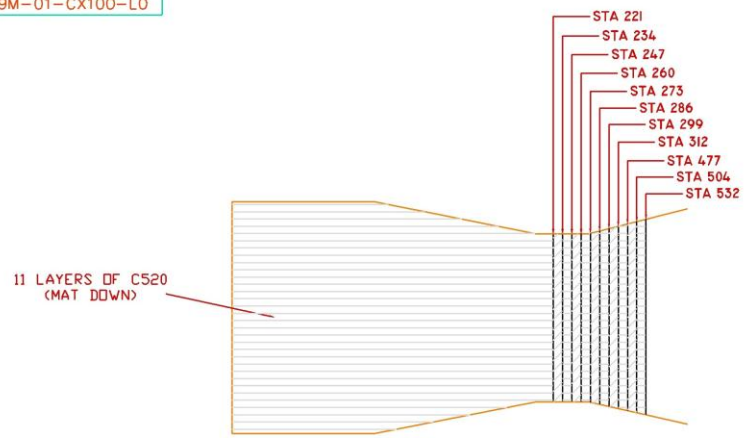
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #51 - 532MM

SECOND: LAYER #52 - 504MM

THIRD: LAYER #53 - 477MM

FOURTH: LAYER #54 - 312MM

FIFTH: LAYER #55 - 299MM

SIXTH: LAYER #56 - 286MM

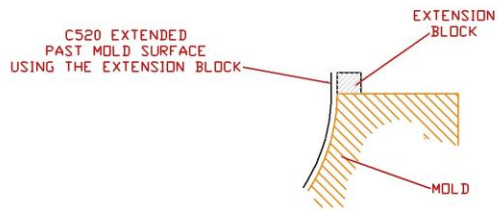
SEVENTH: LAYER #57 - 273MM

EIGHTH: LAYER #58 - 260MM

NINTH: LAYER #59 - 247MM

TENTH: LAYER #60 - 234MM

ELEVENTH: LAYER #61 - 221MM



LAYERS 51-52-53-54-55-56-57-58-59-60-61:

- APPLY 11 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 532, 504, 477, 312, 299, 286, 273, 260, 247, 234 AND 221
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
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TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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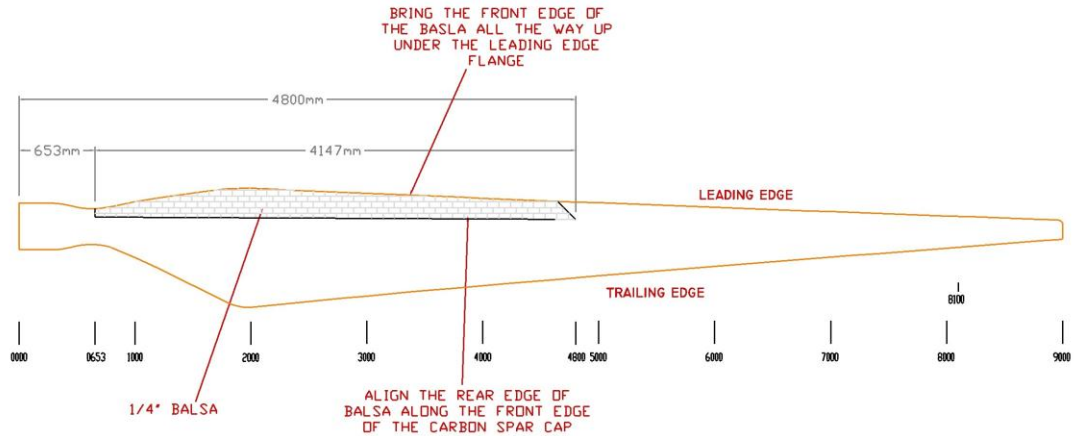
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
FILE: Lam_CX100_HP
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 62:

- APPLY 1/4" BALSA TO THE AREA SHOWN ABOVE
- USE THE LE BALSA TEMPLATE FOR THE BALSA SHAPE
- BUTT THE REAR EDGE OF THE BALSA ALONG THE VERY FRONT EDGE OF THE SPAR CAP
- THE BALSA SHOULD START AT 653MM FROM THE ROOT
- THE BALSA SHOULD TERMINATE 4800MM FROM THE ROOT
- THE FRONT EDGE OF THE BALSA SHOULD EXTEND ALL THE WAY UP UNDER THE LE FLANGE

NO.	PART NO.	DESCRIPTION	QTY
1	46015	BALSA, 1/4" (SF)	22

PARTS LIST

TPI COMPOSITES INC.
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TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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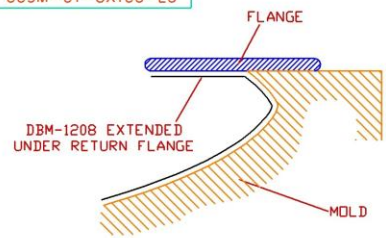
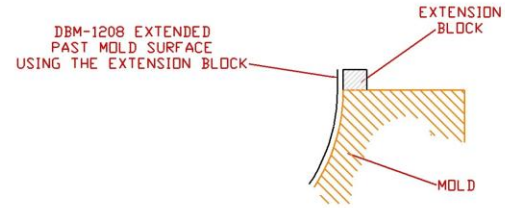
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

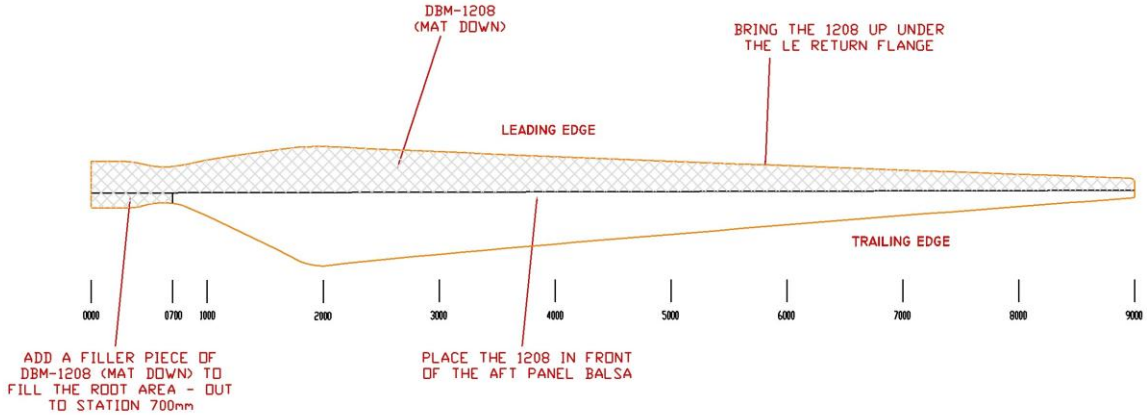
DWG NO SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 63:

- APPLY DBM-1208 TO THE AREA SHOWN ABOVE - THE BACK EDGE OF THE FABRIC SHOULD BE LINED UP WITH THE FORWARD EDGE OF THE AFT PANEL BALSA
- ADD A FILLER PATCH OF DBM-1208 TO FILL THE ROOT AREA - OUT TO 700MM
- BRING THE GLASS UP UNDER THE RETURN FLANGES ALONG THE LEADING EDGE
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS
- PLACE THE DBM-1208 MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	5

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED: MACHINED SURFACE FINISHES 125√ MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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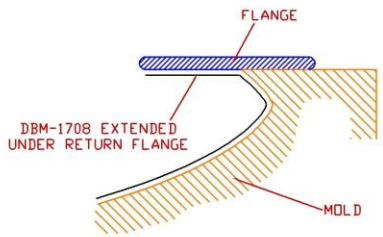
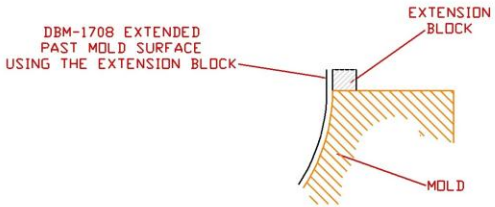
PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

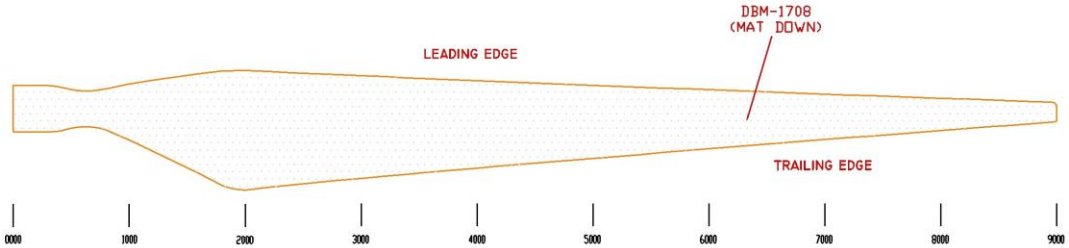
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 64:

- APPLY DBM-1708 TO THE ENTIRE SURFACE OF THE MOLD - PLACE MAT DOWN
- BRING THE GLASS UP UNDER THE RETURN FLANGES IN ALL LOCATIONS
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	11

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100
TITLE: HP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_HP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

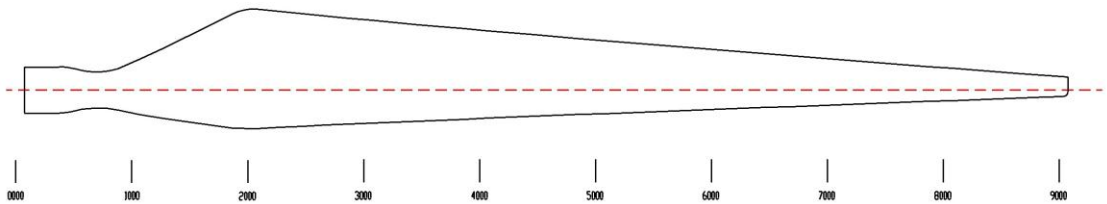
DWG NO. SNL-009M-01-CX100-L0

APPENDIX B: CX-100 LAYUP DRAWINGS – LP SKIN

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

CX-100
9 METER WINDBLADE



LAMINATE SCHEDULE
LOW PRESSURE (LP) SKIN
REV C

NOTE: ALL DIMENSIONS HAVE A TOLERANCE OF ±10MM

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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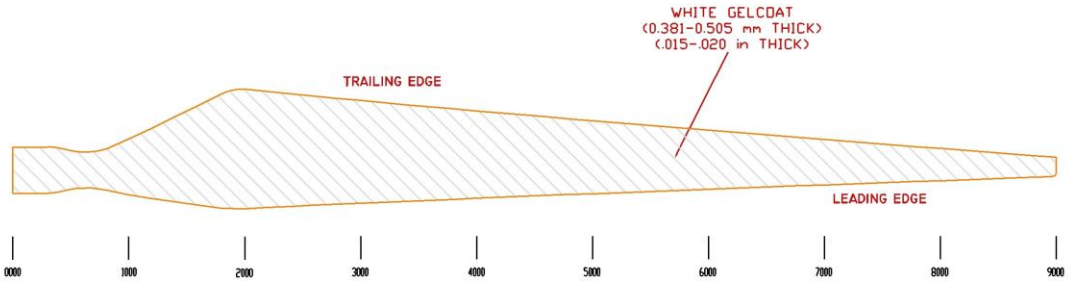
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER I:

- MASK THE FLANGES OF THE MOLD TO AVOIS OVERSPRAY
- SPRAY WHITE GELCOAT OVER ENTIRE SURFACE AS SHOWN
- THICKNESS AFTER SPRAYING SHOULD BE 0.381-0.508 MM (0.015"-0.020")
- ALLOW GEL COAT TO AIR DRY

NO.	PART NO.	DESCRIPTION	QTY
1	46508	GELCOAT, SPORT WHITE, 953-WA411 (LB)	10.0

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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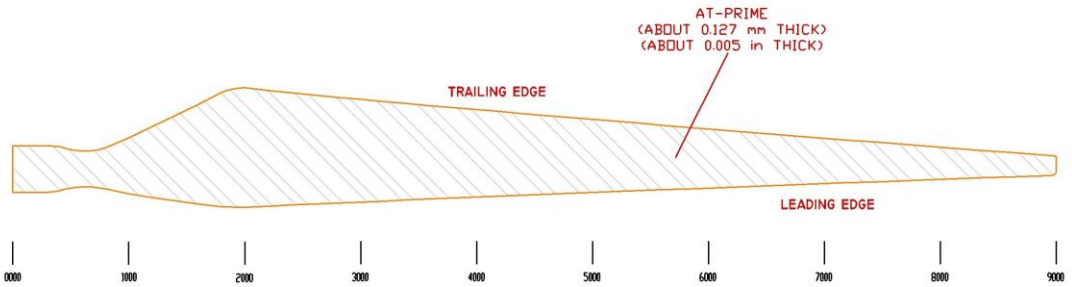
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 2:

- ROLL AT-PRIME OVER ENTIRE SURFACE AS SHOWN
- THICKNESS AFTER SPRAYING SHOULD BE ABOUT 0.127 MM (0.005")
- ALLOW AT-PRIME TO AIR DRY

NO.	PART NO.	DESCRIPTION	QTY
1	46110	AT-PRIME ADHESION, PARTS A AND B (LB)	10.0

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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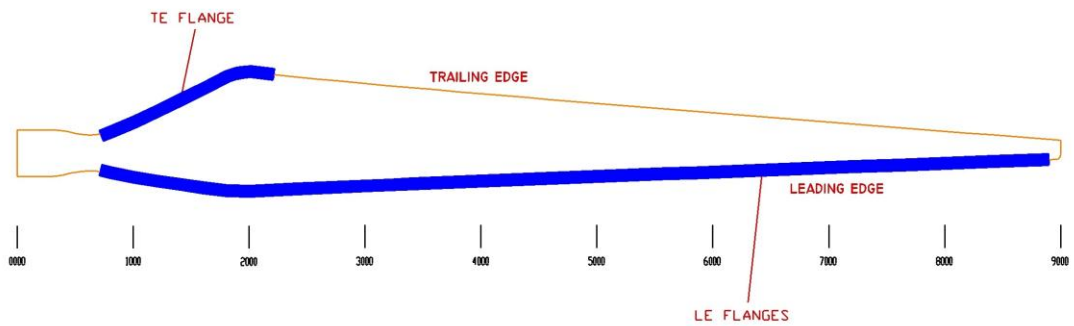
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



INSTALL RETURN FLANGES:

- INSTALL THE RETURN FLANGES ON THE MOLD
- ENSURE ALL FLANGES ARE IN THE CORRECT LOCATION BY MATCHING THE FLANGE NOTATION TO THE MOLD NOTATION
- WAX THE FLANGES TO ALLOW FOR PROPER RELEASE
- ENSURE ALL FASTENERS ARE HAND TIGHT
- (NOTE: IT MAY BE NECESSARY TO LEAVE SOME OF THE FLANGES LOOSE TO FIT FABRIC UNDER - THIGHTEN THE FLANGES BEFORE APPLYING THE VACUUM BAG)

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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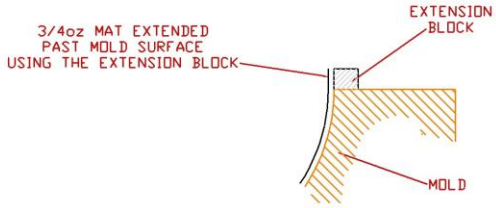
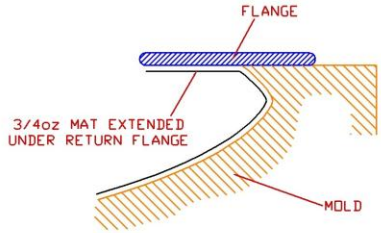
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

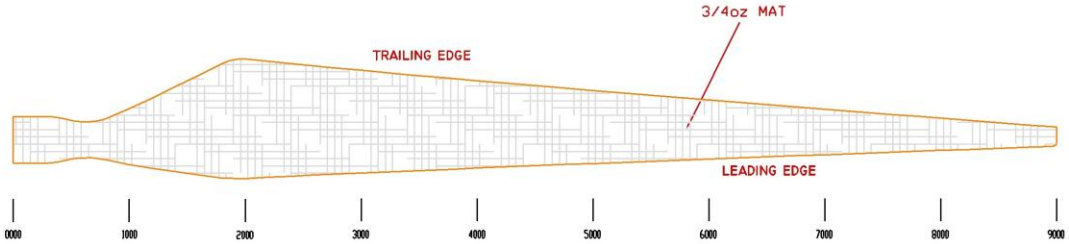
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 3:

- APPLY 3/4oz MAT TO THE ENTIRE SURFACE OF THE MOLD
- BRING THE MAT UP UNDER THE RETURN FLANGES IN ALL LOCATIONS
- BRING MAT ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS

NO.	PART NO.	DESCRIPTION	QTY
1	46051	3/4oz MAT (LB)	3

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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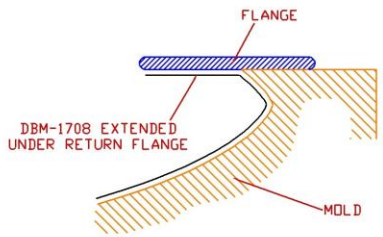
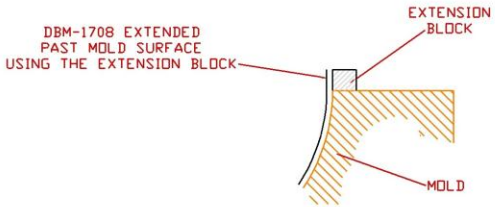
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

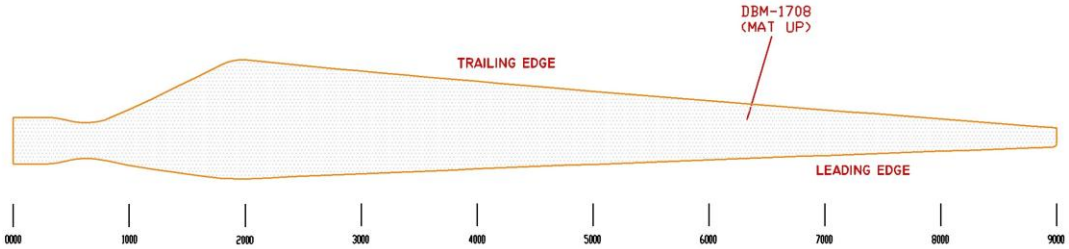
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 4:

- APPLY DBM-1708 TO THE ENTIRE SURFACE OF THE MOLD - PLACE MAT UP
- BRING THE GLASS UP UNDER THE RETURN FLANGES IN ALL LOCATIONS
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	11

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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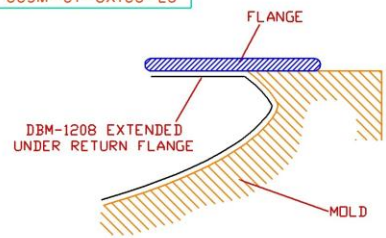
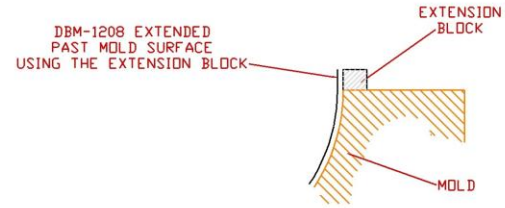
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 5:

- APPLY DBM-1208 TO THE AREA SHOWN ABOVE - PLACE THE 1208 ALONG AND IN FRONT OF THE LINE ON THE PREVIOUS LAYER
- INSTALL AN EXTRA PATCH OF DBM-1208 TO COVER THE ROOT AREA - THIS PATCH SHOULD EXTEND OUT TO STATION 700MM
- BRING THE GLASS UP UNDER THE RETURN FLANGES ALONG THE LEADING EDGE
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS
- PLACE THE DBM-1208 MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	5

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
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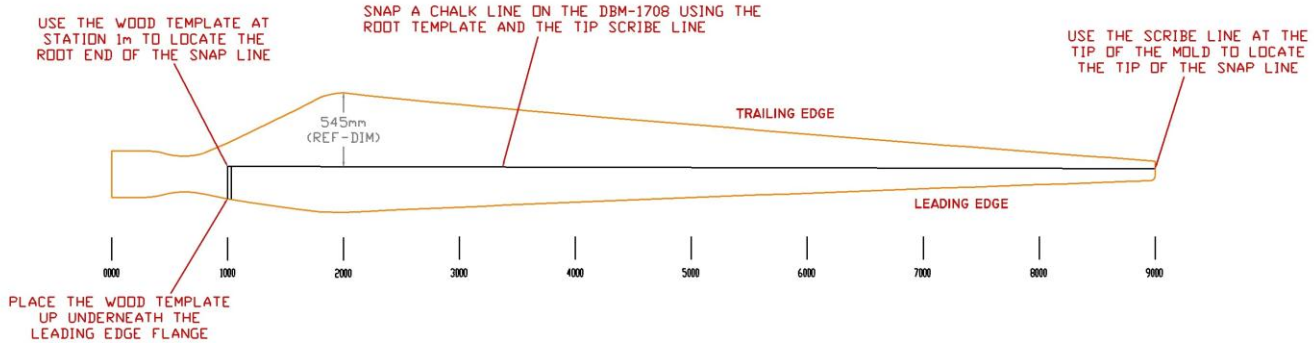

CHALK LINE SNAP:

- SNAP A CHALK LINE ON THE DBM-1708
- USE THE WOOD TEMPLATE AT THE ROOT END OF THE BLADE TO MARK THE END OF THE SNAP LINE - PLACE THE TEMPLATE UNDER THE LEADING EDGE FLANGE AT STATION 1m
- USE THE SCRIBE LINE AT THE TIP OF THE MOLD TO MARK THE OUTBOARD END OF THE SNAP LINE (THE SCRIBE LINE IS 70mm FROM THE TE AT STATION 9m)
- AS A CHECK, THE LINE SHOULD BE 545mm FROM THE TRAILING EDGE AT STATION 2m - FOLLOW THE CONTOUR OF THE MOLD WHEN MAKING THE MEASUREMENT

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED: MACHINED SURFACE FINISHES 125√ MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100

TITLE: LP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO.: SNL-009M-01-CX100-L0 | REV: C

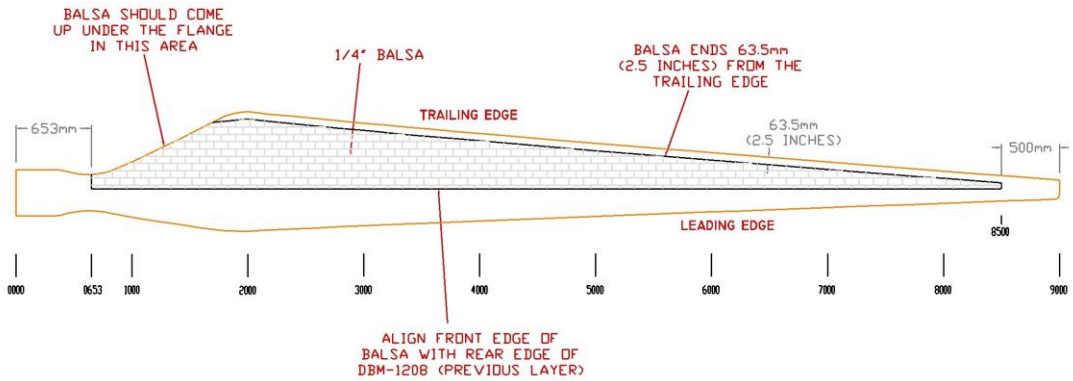
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

FILE: Lam_CX100_LP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 6:

- APPLY 1/4" BALSA TO THE AREA SHOWN ABOVE
- USE THE HP TE BALSA TEMPLATE TO CUT THE SHAPE
- BUTT THE FRONT EDGE ALONG THE REAR EDGE OF THE PREVIOUS LAYER (DBM-1208)
- THE BALSA SHOULD START AT 653 MM FROM THE ROOT
- THE BALSA SHOULD STOP 63.5MM (2.5 INCHES) FROM THE TE
- THE BALSA SHOULD TERMINATE 500MM FROM THE TIP (STA 8500)

NO.	PART NO.	DESCRIPTION	QTY
1	46015	BALSA, 1/4" (SF)	22

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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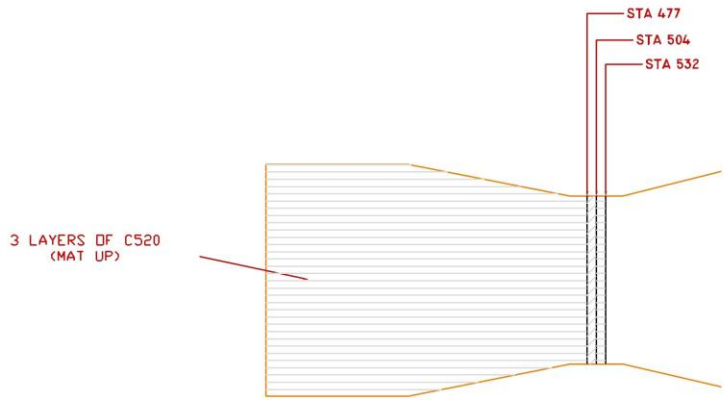
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1
FILE: Lam_CX100_LP
DWG NO SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

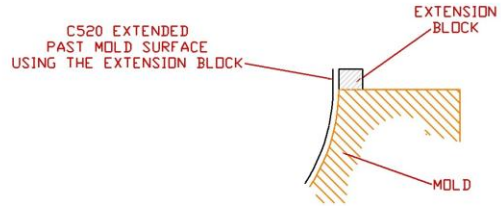


LAY DOWN IN THIS ORDER:

FIRST: LAYER #7 - 477MM

SECOND: LAYER #8 - 504MM

THIRD: LAYER #9 - 532MM



LAYERS 7-8-9:

- APPLY 3 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 477, 504 AND 532
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

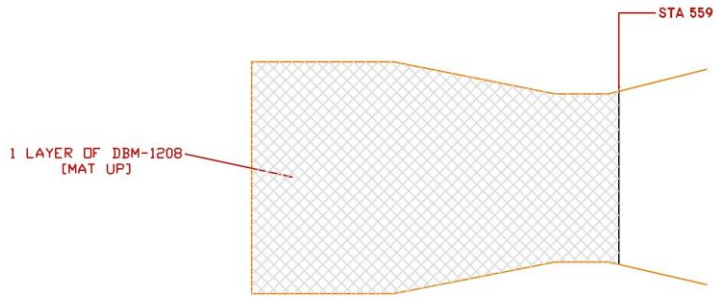
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

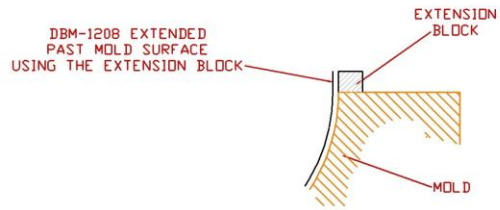
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 10:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 559
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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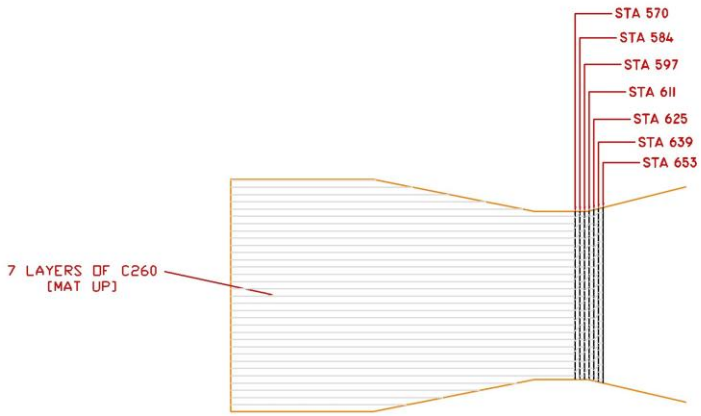
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #11 - 570MM

SECOND: LAYER #12 - 584MM

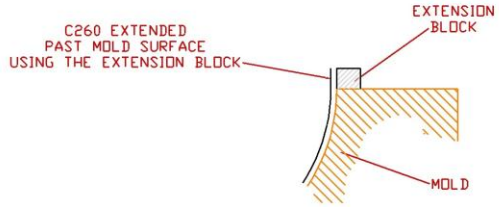
THIRD: LAYER #13 - 597MM

FOURTH: LAYER #14 - 611MM

FIFTH: LAYER #15 - 625MM

SIXTH: LAYER #16 - 639MM

SEVENTH: LAYER #17 - 653MM



LAYERS 11-12-13-14-15-16-17:

- APPLY 7 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 570, 584, 597, 611, 625, 639 AND 653
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

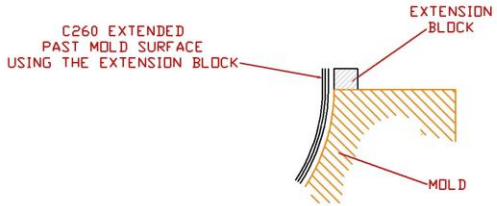
THIRD ANGLE

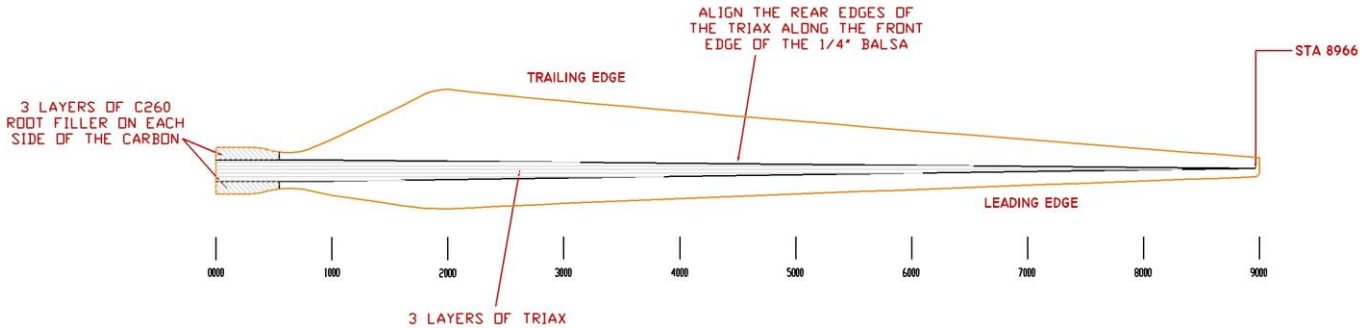
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1
FILE: Lam_CX100_LP
DWG NO SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYERS 18-19-20:

- APPLY 3 LAYERS SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGES ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THESE TRIAX LAYERS WILL COME TO A POINT AT STA 8966
- INSERT 3 LAYERS OF C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100

TITLE: LP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV: C

TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

FILE: Lam_CX100_LP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

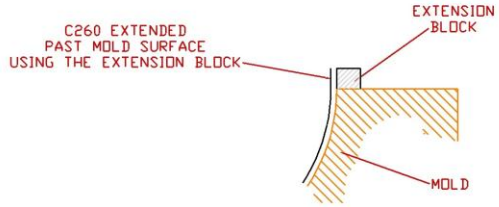
DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

LAY DOWN IN THIS ORDER:

FIRST: LAYER #21 - 474MM

SECOND: LAYER #22 - 458MM



LAYERS 21-22:

- APPLY 2 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 474 AND 458
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

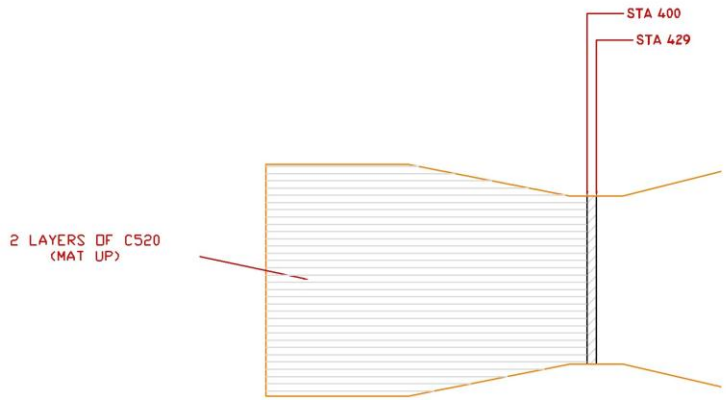
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

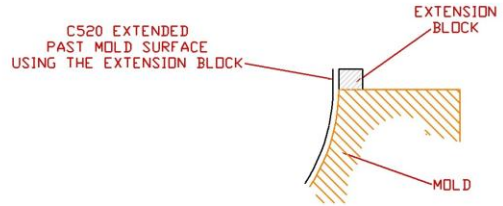
REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #23 - 429MM

SECOND: LAYER #24 - 400MM



LAYERS 23-24:

- APPLY 2 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 429 AND 400
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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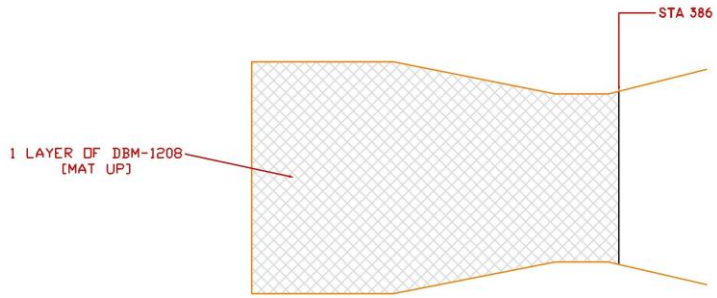
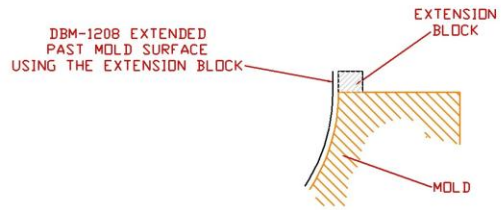
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
FILE: Lam_CX100_LP
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 25:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 386
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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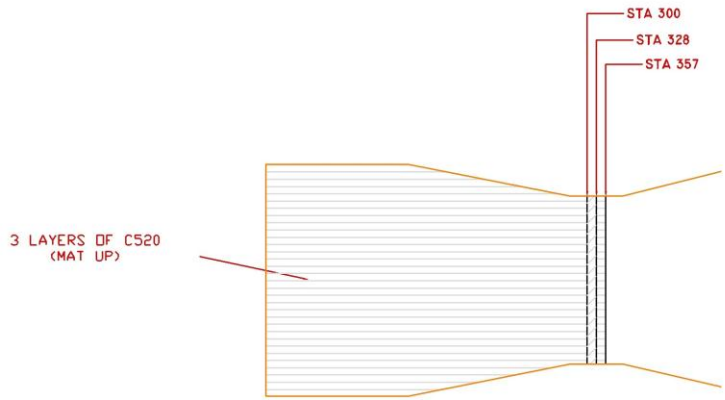
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

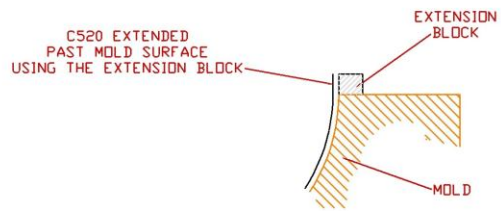


LAY DOWN IN THIS ORDER:

FIRST: LAYER #26 - 357MM

SECOND: LAYER #27 - 328MM

THIRD: LAYER #28 - 300MM



LAYERS 26-27-28:

- APPLY 3 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 357, 328 AND 300
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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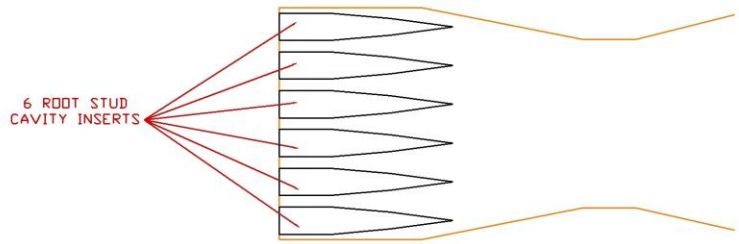
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS

REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 29:

- INSTALL THE SIX ROOT STUD CAVITY INSERTS
- ENSURE THE INSERTS ARE WELL WAXED
- ENSURE THE BOLTS ARE TIGHTENED TO ORIENT THE INSERT PERPENDICULAR TO THE END PLATE - THIS WILL COMPRESS THE FABRIC BELOW THE INSERTS

NO.	PART NO.	DESCRIPTION	QTY
1	85006	ROOT STUD, 3/4-16 (EA)	6

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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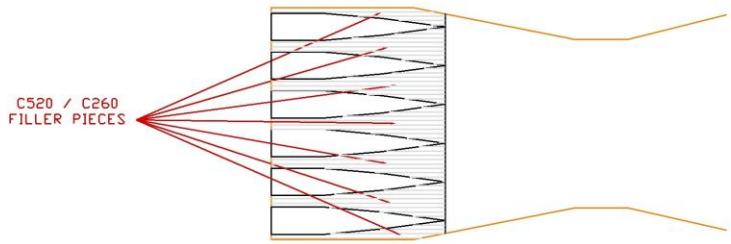
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 30:

- INSTALL C520 AND/OR C260 STRIPS BETWEEN THE ROOT STUD CAVITIES TO FILL THE GAPS UP TO THE LEVEL OF THE TOP OF THE CAVITIES
- SCRAP PIECES OF C520 AND C260 MAY BE USED FOR THIS STEP

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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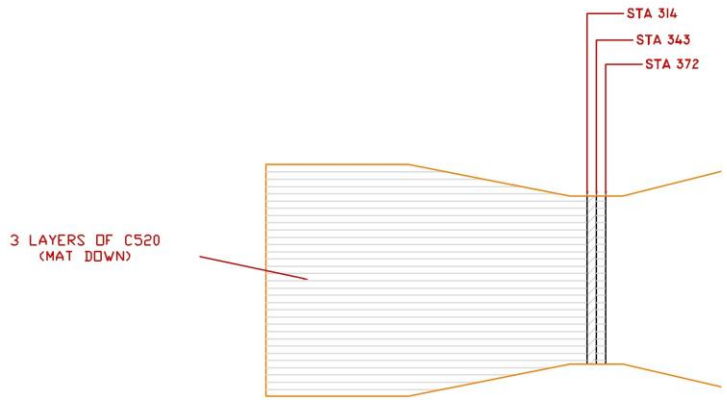
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

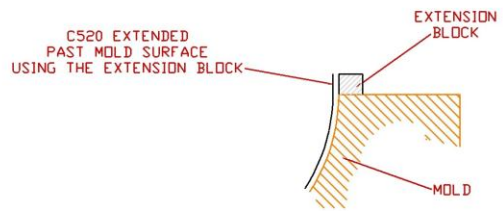


LAY DOWN IN THIS ORDER:

FIRST: LAYER #31 - 314MM

SECOND: LAYER #32 - 343MM

THIRD: LAYER #33 - 372MM



LAYERS 31-32-33:

- APPLY 3 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 314, 343 AND 372
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100

TITLE: LP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO.: SNL-009M-01-CX100-L0 | REV: C

TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

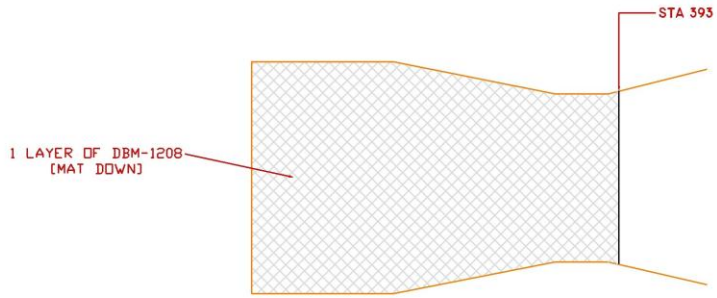
FILE: Lam_CX100_LP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

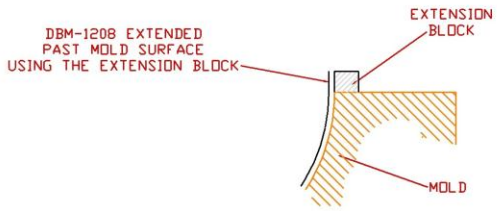
DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS

REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 34:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 393
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

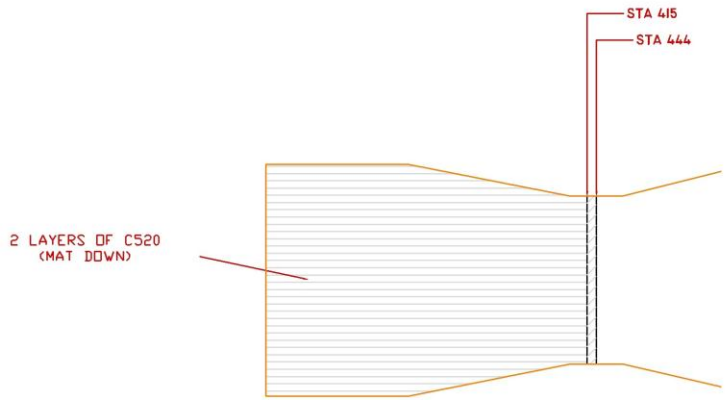
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

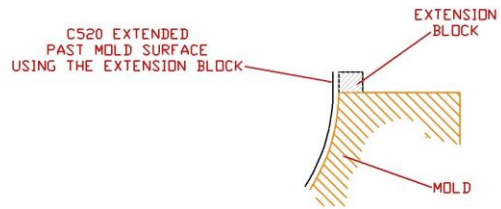
REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #35 - 415MM

SECOND: LAYER #36 - 444MM



LAYERS 35-36:

- APPLY 2 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 415 AND 444
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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PROJECT: CX-100

TITLE: LP SKIN LAMINATE SCHEDULE

SIZE: A | DWG NO.: SNL-009M-01-CX100-L0 | REV: C

TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

FILE: Lam_CX100_LP | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

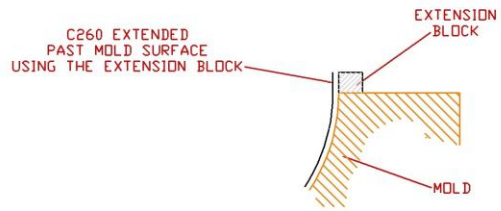
DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

LAY DOWN IN THIS ORDER:

FIRST: LAYER #37 - 466MM

SECOND: LAYER #38 - 481MM



LAYERS 37-38:

- APPLY 2 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 466 AND 481
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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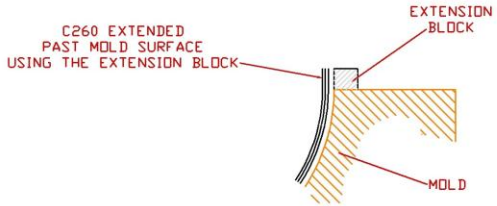
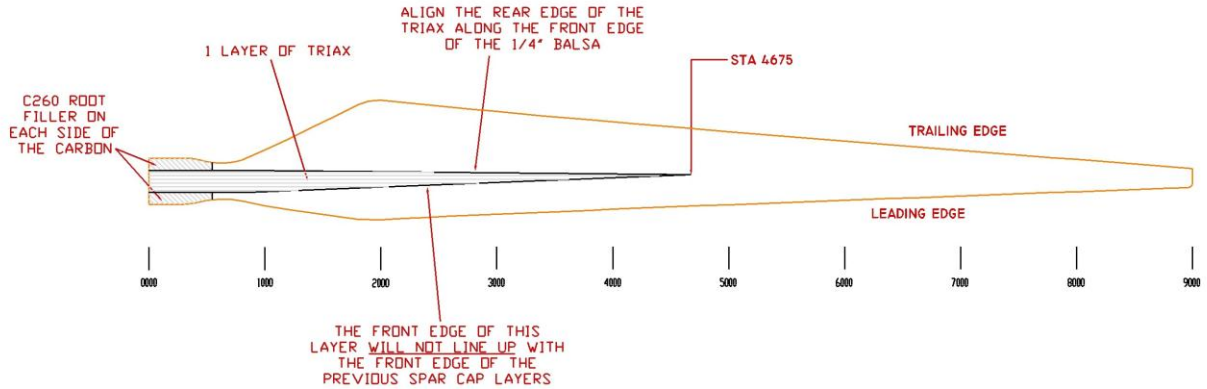
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 39:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 4675
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

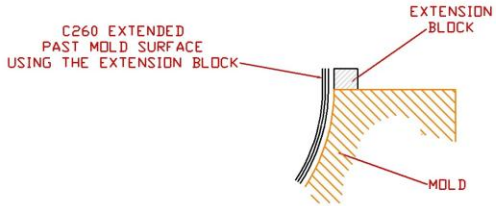
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

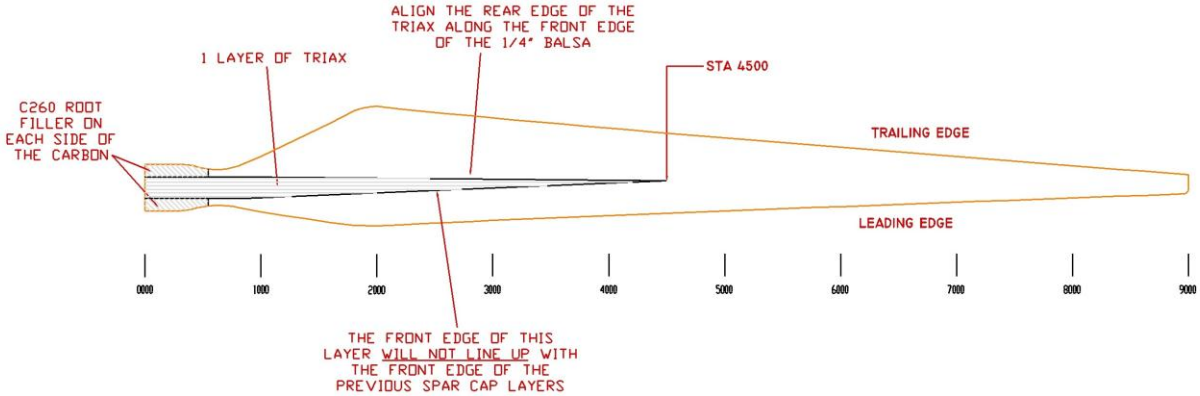
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 40:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 4500
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

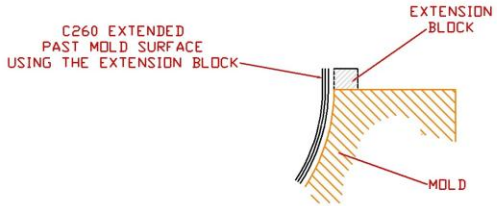
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

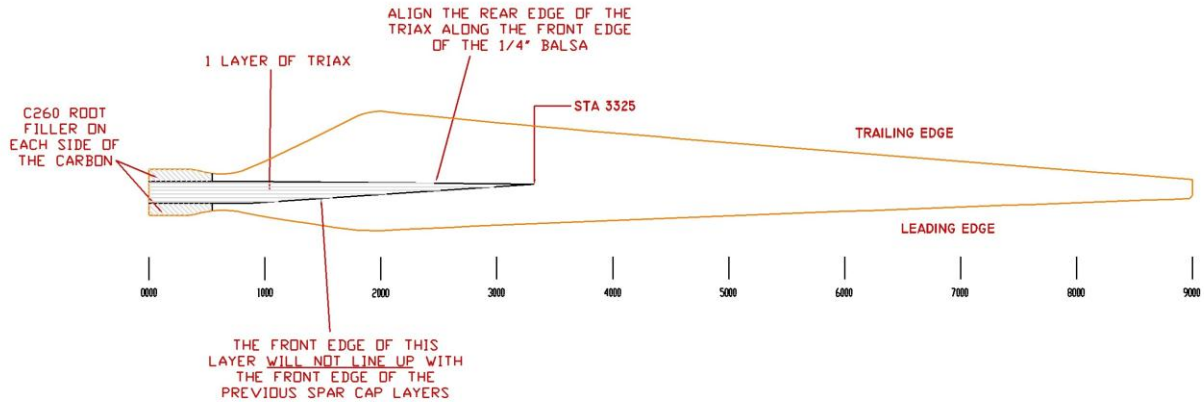
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 41:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 3325
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION		QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz	(LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL	(LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030
THIRD ANGLE

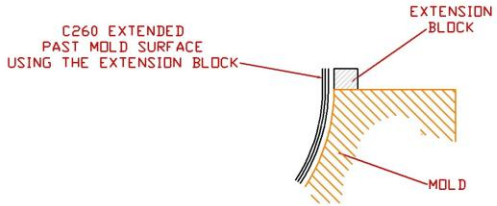
THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

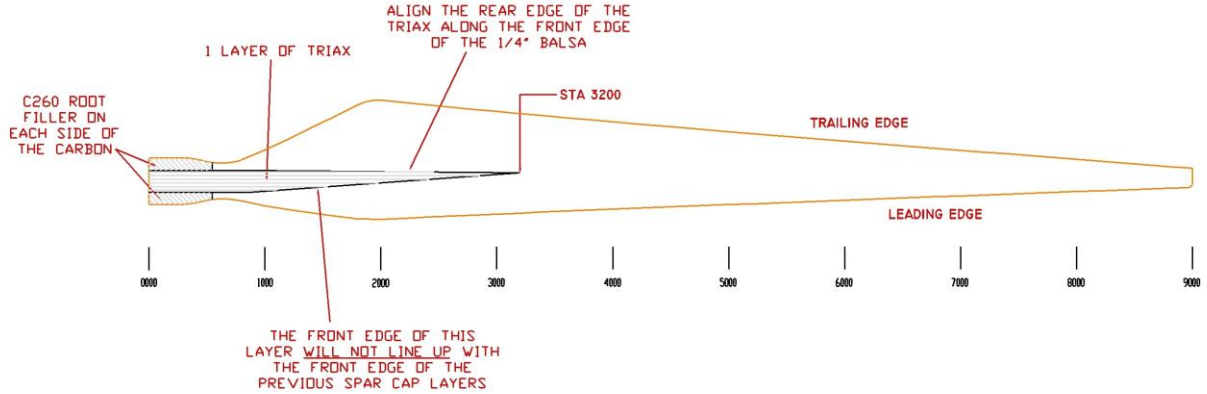
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 42:

- APPLY 1 LAYER SAERTEX HYBRID TRIAX TO THE SPAR CAP AREA SHOWN ABOVE
- ALIGN THE REAR EDGE ALONG THE FRONT EDGE OF THE 1/4" BALSA
- THIS TRIAX LAYER WILL COME TO A POINT AT STA 3200
- INSERT C260 ROOT FILLER PIECES ON BOTH SIDES OF THE CARBON IN THE ROOT AREA AS SHOWN
- EXTEND THE FILLER PIECES UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT

NO.	PART NO.	DESCRIPTION	QTY
2	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR
1	46016	SAERTEX CARBON/GLASS HYBRID TRIAXIAL (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04

LAY DOWN IN THIS ORDER:

FIRST: LAYER #43 - 653MM

SECOND: LAYER #44 - 639MM

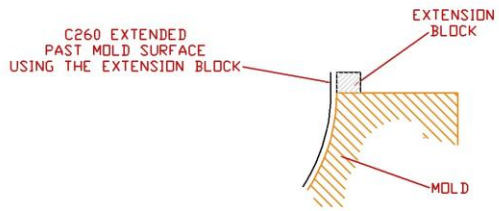
THIRD: LAYER #45 - 625MM

FOURTH: LAYER #46 - 611MM

FIFTH: LAYER #47 - 597MM

SIXTH: LAYER #48 - 584MM

SEVENTH: LAYER #49 - 570MM



LAYERS 43-44-45-46-47-48-49:

- APPLY 7 LAYERS C260 TO THE ROOT AREA SHOWN ABOVE
- THE C260 LAYERS END AT STA 653, 639, 625, 611, 597, 584 AND 570
- EXTEND THE C260 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE C260 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	85200	GLASS, UNIDIRECTIONAL, C260, 26oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

THIS DOCUMENT IS THE PROPERTY OF T.P.I. AND IS NOT TO BE USED OR REPRODUCED IN WHOLE OR IN PART WITHOUT WRITTEN PERMISSION.

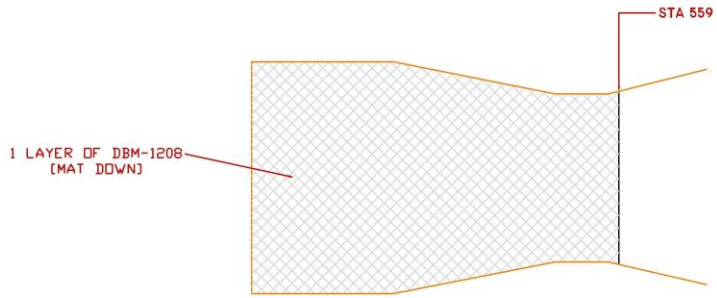
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

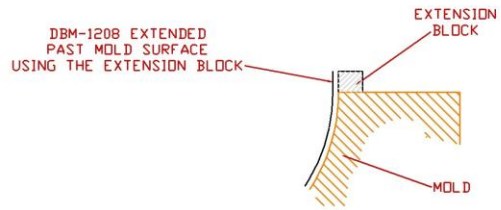
DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS

REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 50:

- APPLY 1 LAYERs DBM-1208 TO THE ROOT AREA SHOWN ABOVE
- THE LAYER ENDS AT STA 559
- EXTEND UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- THE DBM-1208 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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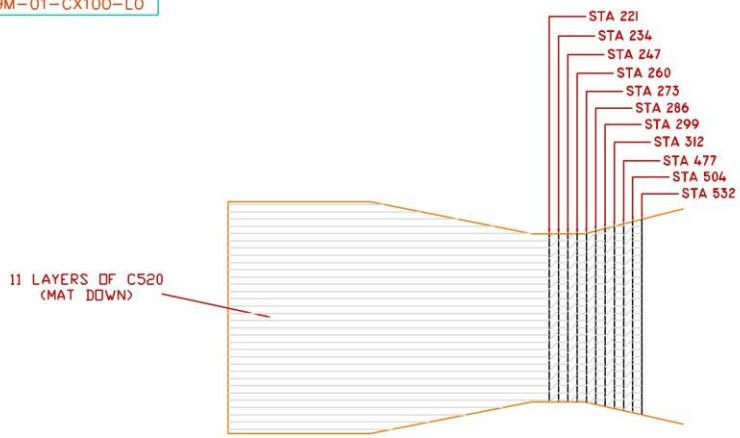
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAY DOWN IN THIS ORDER:

FIRST: LAYER #51 - 532MM

SECOND: LAYER #52 - 504MM

THIRD: LAYER #53 - 477MM

FOURTH: LAYER #54 - 312MM

FIFTH: LAYER #55 - 299MM

SIXTH: LAYER #56 - 286MM

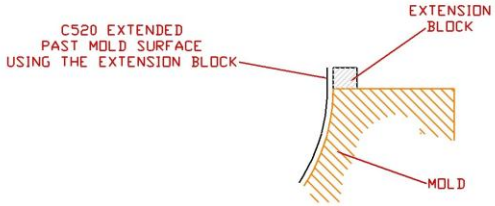
SEVENTH: LAYER #57 - 273MM

EIGHTH: LAYER #58 - 260MM

NINTH: LAYER #59 - 247MM

TENTH: LAYER #60 - 234MM

ELEVENTH: LAYER #61 - 221MM



LAYERS 51-52-53-54-55-56-57-58-59-60-61:

- APPLY 11 LAYERs C520 TO THE ROOT AREA SHOWN ABOVE
- THE C520 LAYERS END AT STA 532, 504, 477, 312, 299, 286, 273, 260, 247, 234 AND 221
- EXTEND THE C520 UP PAST THE MOLD SURFACE IN THE ROOT AREA AS SHOWN IN THE INSERT
- ALL LAYERS SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46510	GLASS, UNIDIRECTIONAL, C520, 52oz (LB)	AR

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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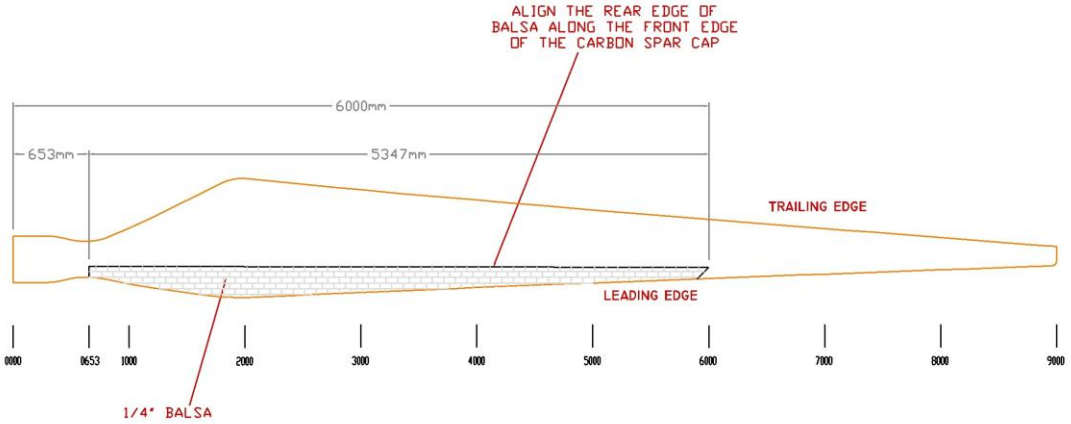
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
FILE: Lam_CX100_LP
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1

DWG NO SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04



LAYER 62:

- APPLY 1/4" BALSA TO THE AREA SHOWN ABOVE
- USE THE LP LE BALSA TEMPLATE FOR THE SHAPE
- BUTT THE REAR EDGE OF THE BALSA ALONG THE VERY FRONT EDGE OF THE SPAR CAP
- THE BALSA SHOULD START AT 653MM FROM THE ROOT
- THE BALSA SHOULD TERMINATE 500MM FROM THE ROOT (AT STATION 8500MM)
- BRING THE BALSA UP UNDER THE LEADING EDGE FLANGE

NO.	PART NO.	DESCRIPTION	QTY
1	46015	BALSA, 1/4" (SF)	22

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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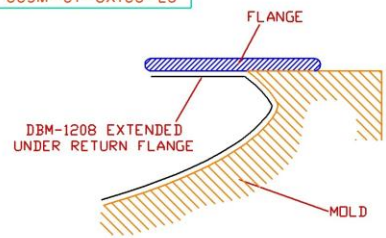
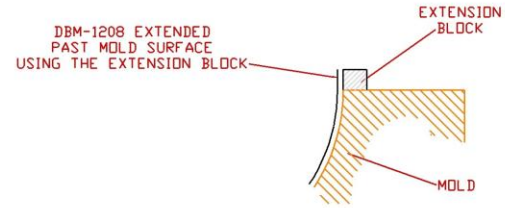
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

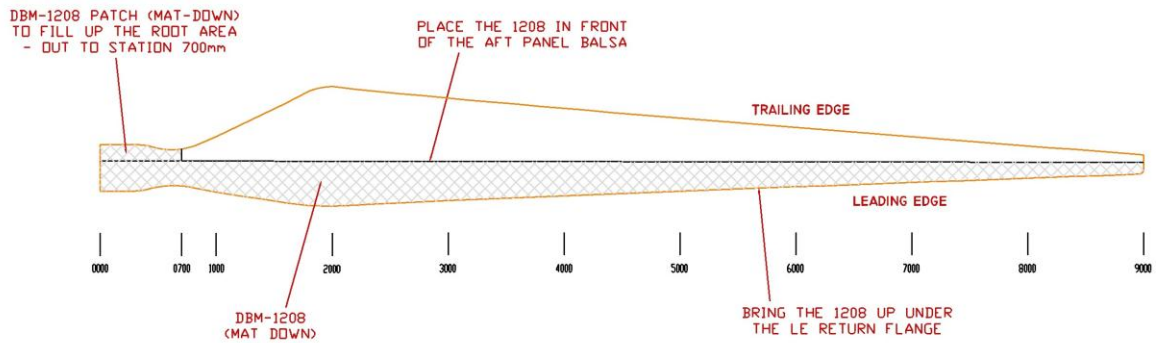
DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04







LAYER 63:

- APPLY DBM-1208 TO THE AREA SHOWN ABOVE - THE BACK EDGE OF THE FABRIC SHOULD BE LINED UP WITH THE FORWARD EDGE OF THE AFT PANEL BALSA
- INSTALL AN EXTRA PATCH OF DBM-1208 TO COVER THE ROOT AREA - THIS PATCH SHOULD EXTEND OUT TO STATION 700MM
- BRING THE GLASS UP UNDER THE RETURN FLANGES ALONG THE LEADING EDGE
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS
- PLACE THE DBM-1208 MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46250	GLASS, BIAXIAL, DBM-1208 (LB)	5

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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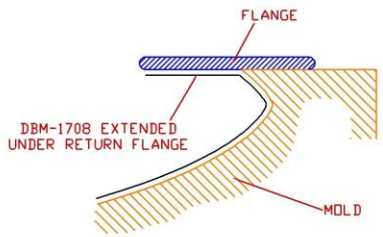
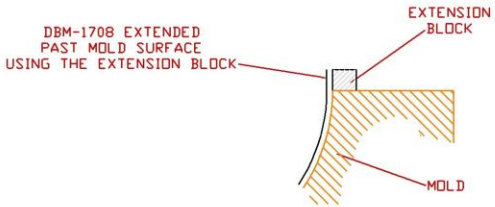
PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04
C	POST-PROTOTYPE PRODUCTION LAMINATE	DSB		9/6/04





LAYER 64:

- APPLY DBM-1708 TO THE ENTIRE SURFACE OF THE MOLD - PLACE MAT DOWN
- BRING THE GLASS UP UNDER THE RETURN FLANGES IN ALL LOCATIONS
- BRING GLASS ABOUT 25MM PAST THE MOLD SURFACE IN THE ROOT AREA - USE THE MOLD EXTENSION BLOCKS

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	11

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100
TITLE: LP SKIN LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: C
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_LP
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

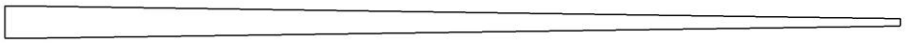
DWG NO. SNL-009M-01-CX100-L0

APPENDIX C: CX-100 LAYUP DRAWINGS -- SHEAR WEB

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04

CX-100
9 METER WINDBLADE



LAMINATE SCHEDULE
SHEAR WEB
REV B

NOTE: ALL DIMENSIONS HAVE A TOLERANCE OF ±10MM

NO.	PART NO.	DESCRIPTION	QTY

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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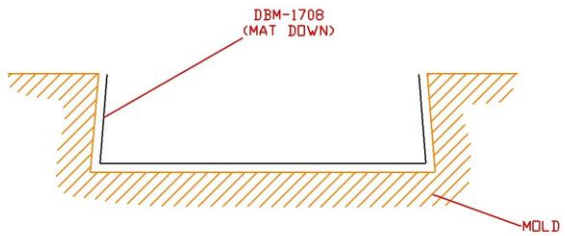
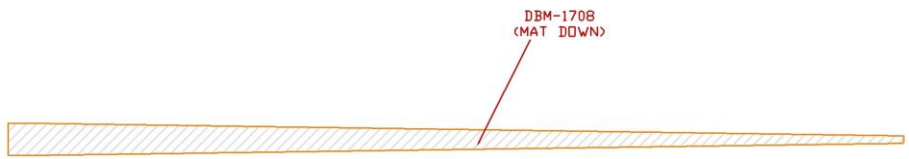
PROJECT: CX-100
TITLE: SHEAR WEB LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: B
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
FILE: Lam_CX100_SW
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO.
SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04





STEP 1 / LAYER 1:

- APPLY DBM-1708 TO THE ENTIRE MOLD SURFACE
- THE 1708 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	4

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

ALL DIMENSIONS IN mm

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

THIRD ANGLE

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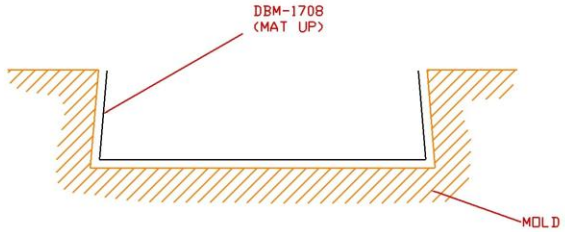
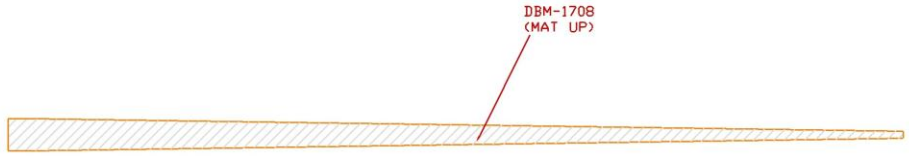
PROJECT: CX-100
TITLE: SHEAR WEB LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: B
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1
FILE: Lam_CX100_SW

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04





STEP 2 / LAYER 2:

- APPLY DBM-1708 TO THE ENTIRE MOLD SURFACE
- THE 1708 SHOULD BE PLACED MAT UP

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	4

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
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MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100

TITLE: SHEAR WEB LAMINATE SCHEDULE

SIZE: A | DWG NO. SNL-009M-01-CX100-L0 | REV: B

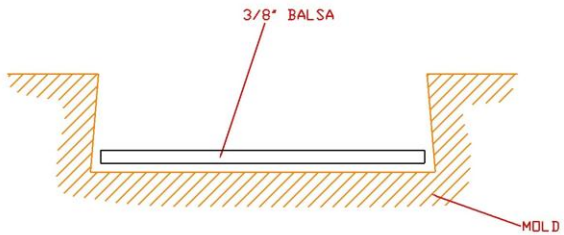
TPI PART #: CX100 | DR BY: DSB | CHK'D BY: | APP'D BY:

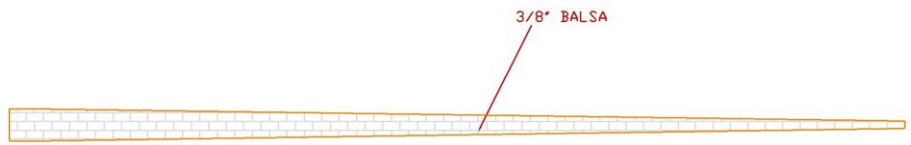
FILE: Lam_CX100_SW | DATE: 12/11/03 | SCALE: NONE | SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04





STEP 3 / LAYER 3:

- APPLY 3/8" BLASA TO THE WEB (NOT THE FLANGES) AS SHOWN ABOVE

NO.	PART NO.	DESCRIPTION	QTY
1	47057	BALSA, 3/8", CK-100, AL-600 (SF)	15

PARTS LIST

TPI COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
MACHINED SURFACE FINISHES 125√
MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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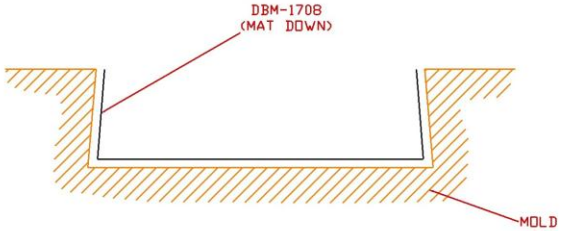
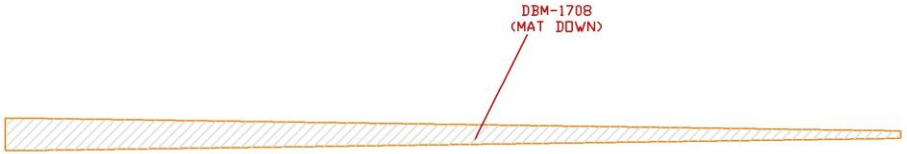
PROJECT: CX-100
TITLE: SHEAR WEB LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: B
TPI PART #: CX100
DR BY: DSB
DATE: 12/11/03
FILE: Lam_CX100_SW
CHK'D BY:
APP'D BY:
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

DWG NO. SNL-009M-01-CX100-L0

REVISIONS				
REV	DESCRIPTION	BY	APPR.	DATE
A	DETAIL DESIGN LAMINATE	DSB		12/11/03
B	PROTOTYPE PRODUCTION LAMINATE	DSB		7/5/04





STEP 4 / LAYER 4:

- APPLY DBM-1708 TO THE ENTIRE MOLD SURFACE
- THE 1708 SHOULD BE PLACED MAT DOWN

NO.	PART NO.	DESCRIPTION	QTY
1	46262	GLASS, BIAXIAL, DBM-1708 (LB)	4

PARTS LIST

tpi COMPOSITES INC.
RT. 136 MARKET ST. WARREN, R.I. 02885-0328
TEL. (401) 245-1200 FAX (401) 245-3160

.X	.XX	.XXX	ANGLES
±10	±10	±10	±5°

UNLESS OTHERWISE SPECIFIED:
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MACHINED FILLET RADII .015-.030

ALL DIMENSIONS IN mm

THIRD ANGLE

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PROJECT: CX-100
TITLE: SHEAR WEB LAMINATE SCHEDULE
SIZE: A
DWG NO.: SNL-009M-01-CX100-L0
REV: B
TPI PART #: CX100
DR BY: DSB
CHK'D BY:
APP'D BY:
FILE: Lam_CX100_SW
DATE: 12/11/03
SCALE: NONE
SHT: 1 OF 1

DWG NO. SNL-009M-01-CX100-L0

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