Table 1 Glossary of variables used in the generic case, "span9" (This is part of the span9.DEF file, created automatically by the GENOPT processor, GENTEXT, with use of information, variable names and one-line definitions provided by the GENOPT user.)

```
C=====================================================================================================
C  ARRAY  NUMBER OF          PROMPT
C    ?   (ROWS,COLS)  ROLE  NUMBER   NAME                  DEFINITION OF VARIABLE
C                           (span9.PRO)
C=====================================================================================================
C    n   (   0,   0)    2      10   WIDTH    = total width of the corrugated panel
C    n   (   0,   0)    2      15   LENGTH   = axial length of the corrugated panel
C    n   (   0,   0)    2      25   FACLEN   = fraction of LENGTH for local buckling model
C    n   (   0,   0)    2      30   NSEG     = number of major segments in WIDTH/2
C    n   (   0,   0)    2      40   EMOD     = elastic modulus of the material
C    n   (   0,   0)    2      45   NU       = Poisson ratio of the panel material
C    n   (   0,   0)    2      50   DENSTY   = weight density of the panel material
C    n   (   0,   0)    2      60   MLOWGS   = low end of M-range: symmetric GENERAL buckling
C    n   (   0,   0)    2      65   MHIGHGS  = high end of M-range: symmetric GENERAL buckling
C    n   (   0,   0)    2      70   MLOWGA   = low end of M-range: antisymmetric GENERAL buckling
C    n   (   0,   0)    2      75   MHIGHGA  = high end of M-range: antisymmetric GENERAL buckling
C    n   (   0,   0)    2      80   MLOWL    = low end of the M-range: LOCAL buckling
C    n   (   0,   0)    2      85   MHIGHL   = high end of the M-range: LOCAL buckling
C    n   (   0,   0)    2      95   IELMNT   = finite element used in STAGS model
C    n   (   0,   0)    2     105   INSUBSE  = major segment number in NSUBSEG(INSUBSE)
C    y   (  19,   0)    2     110   NSUBSEG  = number of sub-segments in major segment
C    y   (  19,   0)    2     120   UPDOWN   = 1 = convex surface up; 2 = convex down
C    n   (   0,   0)    2     130   JUPDWNS  = major segment number in UPDWNS(IUPDWNS,JUPDWNS)
C    n   (   0,   0)    2     135   IUPDWNS  = sub-segment number in UPDWNS(IUPDWNS,JUPDWNS)
C    y   (  50,  19)    2     140   UPDWNS   = 1=convex up; 2=convex down (subsegments)
C    n   (   0,   0)    2     150   UPDNBIG  = 1=convex up (hill); 2=convex down (valley)
C    n   (   0,   0)    2     160   ITHICK   = major segment number in THICK(ITHICK)
C    y   (  19,   0)    1     165   THICK    = wall thickness of the major segment
C    y   (  19,   0)    1     170   SUBWID   = projected width (x-width) of major segment
C    y   (  19,   0)    1     175   PHISEG   = half-angle (deg.) of major corrugation
C    y   (  19,   0)    1     180   PHISUB   = half-angle (deg.) of sub-corrugation
C    n   (   0,   0)    2     190   IYPLATE  = vertical displacement number in YPLATE(IYPLATE)
C    y   (  20,   0)    1     195   YPLATE   = vertical y above (x,y,z) origin if PHIBIG=0
C    n   (   0,   0)    1     200   PHIBIG   = half-angle (deg.) of overall arching
C    n   (   0,   0)    2     210   NCASES   = Number of load cases (number of environments)  in
TOTLOD(NCASES)
C    y   (  20,   0)    3     215   TOTLOD   = total axial load (e.g. lb) over WIDTH
C    y   (  20,   0)    4     225   LOCBUK   = local buckling load factor
C    y   (  20,   0)    5     235   LOCBUKA  = allowable for local buckling
C    y   (  20,   0)    6     240   LOCBUKF  = factor of safety for local buckling
C    y   (  20,   0)    4     245   BUKSYM   = symmetric general buckling
C    y   (  20,   0)    5     250   BUKSYMA  = allowable for sym. general buckling
C    y   (  20,   0)    6     255   BUKSYMF  = f.s. for symmetric general buckling
C    y   (  20,   0)    4     260   BUKASY   = antisymmetric general buckling
C    y   (  20,   0)    5     265   BUKASYA  = allowable for antisym. general buckling
C    y   (  20,   0)    6     270   BUKASYF  = f.s. for antisym. general buckling
C    n   (   0,   0)    2     280   JCYLBUK  = segment number in CYLBUK(NCASES,JCYLBUK)
C    y   (  20,  19)    4     285   CYLBUK   = classical buckling load factor
C    y   (  20,  19)    5     290   CYLBUKA  = allowable for classical buckling
C    y   (  20,  19)    6     295   CYLBUKF  = factor of safety for classical buckling
C    y   (  20,   0)    4     300   STRESS   = maximum effective stress
C    y   (  20,   0)    5     305   STRESSA  = allowable effective stress
C    y   (  20,   0)    6     310   STRESSF  = factor of safety for stress
C    n   (   0,   0)    7     315   WEIGHT   = weight of the corrugated panel
=========================================================================================
```

Table 2 Input data for the GENOPT processor, BEGIN (the file called fold98updown.BEG). These input data are provided by the End user for the specific case called "fold98updown". (See Fig. 3, middle frame.)

```
================================================================================
      n         $ Do you want a tutorial session and tutorial output?
   100.0000     $ total width of the corrugated plate: WIDTH
   100.0000     $ axial length of the corrugated plate: LENGTH
  0.3000000     $ fraction of LENGTH for local buckling model: FACLEN
        8       $ number of major segments in WIDTH/2: NSEG
  0.1000000E+08 $ elastic modulus of the material: EMOD
  0.3000000     $ Poisson ratio of the plate material: NU
  0.1000000     $ weight density of the plate material: DENSTY
        1       $ low end of M-range: symmetric GENERAL buckling: MLOWGS
        5       $ high end of M-range: symmetric GENERAL buckling: MHIGHGS
        1       $ low end of M-range: antisymmetric GENERAL buckling: MLOWGA
        5       $ high end of M-range: antisymmetric GENERAL buckling: MHIGHGA
        1       $ low end of the M-range: LOCAL buckling: MLOWL
       30       $ high end of the M-range: LOCAL buckling: MHIGHL
      480       $ finite element used in STAGS model: IELMNT
        8       $ Number INSUBSE of rows in the array  NSUBSEG: INSUBSE
        0       $ number of sub-segments in major segment: NSUBSEG(  1)
        0       $ number of sub-segments in major segment: NSUBSEG(  2)
        0       $ number of sub-segments in major segment: NSUBSEG(  3)
        0       $ number of sub-segments in major segment: NSUBSEG(  4)
        0       $ number of sub-segments in major segment: NSUBSEG(  5)
        0       $ number of sub-segments in major segment: NSUBSEG(  6)
        0       $ number of sub-segments in major segment: NSUBSEG(  7)
        0       $ number of sub-segments in major segment: NSUBSEG(  8)
        1       $ 1 = convex surface up; 2 = convex down: UPDOWN(  1)
        2       $ 1 = convex surface up; 2 = convex down: UPDOWN(  2)
        1       $ 1 = convex surface up; 2 = convex down: UPDOWN(  3)
        2       $ 1 = convex surface up; 2 = convex down: UPDOWN(  4)
        1       $ 1 = convex surface up; 2 = convex down: UPDOWN(  5)
        2       $ 1 = convex surface up; 2 = convex down: UPDOWN(  6)
        1       $ 1 = convex surface up; 2 = convex down: UPDOWN(  7)
        2       $ 1 = convex surface up; 2 = convex down: UPDOWN(  8)
        0       $ Number JUPDWNS of columns in the array, UPDWNS: JUPDWNS
        1       $ 1=convex up (hill); 2=convex down (valley): UPDNBIG
        8       $ Number ITHICK  of rows in the array  THICK: ITHICK
  0.1000000     $ wall thickness of the major segment: THICK(  1)
  0.1000000     $ wall thickness of the major segment: THICK(  2)
  0.1000000     $ wall thickness of the major segment: THICK(  3)
  0.1000000     $ wall thickness of the major segment: THICK(  4)
  0.1000000     $ wall thickness of the major segment: THICK(  5)
  0.1000000     $ wall thickness of the major segment: THICK(  6)
  0.1000000     $ wall thickness of the major segment: THICK(  7)
  0.1000000     $ wall thickness of the major segment: THICK(  8)
   6.250000     $ projected width (x-width) of sub-plate: SUBWID(  1)
   6.250000     $ projected width (x-width) of sub-plate: SUBWID(  2)
   6.250000     $ projected width (x-width) of sub-plate: SUBWID(  3)
```

```
 6.250000      $ projected width (x-width) of sub-plate: SUBWID(  4)
 6.250000      $ projected width (x-width) of sub-plate: SUBWID(  5)
 6.250000      $ projected width (x-width) of sub-plate: SUBWID(  6)
 6.250000      $ projected width (x-width) of sub-plate: SUBWID(  7)
 6.250000      $ projected width (x-width) of sub-plate: SUBWID(  8)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  1)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  2)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  3)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  4)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  5)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  6)
 60.00000      $ half-angle (deg.) of major corrugation: PHISEG(  7)
 30.00000      $ half-angle (deg.) of major corrugation: PHISEG(  8)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  1)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  2)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  3)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  4)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  5)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  6)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  7)
 70.00000      $ half-angle (deg.) of sub-corrugation: PHISUB(  8)
       9       $ Number IYPLATE of rows in the array  YPLATE: IYPLATE
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  1)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  2)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  3)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  4)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  5)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  6)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  7)
 30.00000      $ vertical distance above (x,y,z) origin: YPLATE(  8)
 28.33333      $ vertical distance above (x,y,z) origin: YPLATE(  9)
 10.00000      $ half-angle (deg.) of overall arching: PHIBIG
       1       $ Number NCASES  of load cases (environments): NCASES
-200000.0      $ total axial load (e.g. lb): TOTLOD(  1)
 1.000000      $ allowable for local buckling: LOCBUKA(  1)
 2.000000      $ factor of safety for local buckling: LOCBUKF(  1)
 1.000000      $ allowable for sym. general buckling: BUKSYMA(  1)
 1.500000      $ f.s. for symmetric general buckling: BUKSYMF(  1)
 1.000000      $ allowable for antisym. general buckling: BUKASYA(  1)
 1.500000      $ f.s. for antisym. general buckling: BUKASYF(  1)
       8       $ Number JCYLBUK of columns in the array, CYLBUK: JCYLBUK
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  1)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  2)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  3)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  4)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  5)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  6)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  7)
 1.000000      $ allowable for classical buckling: CYLBUKA(  1,  8)
 1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  1)
 1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  2)
 1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  3)
 1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  4)
```

```
   1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  5)
   1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  6)
   1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  7)
   1.000000      $ factor of safety for classical buckling: CYLBUKF(  1,  8)
   100000.0      $ allowable effective stress: STRESSA(  1)
   1.500000      $ factor of safety for stress: STRESSF(  1)
===============================================================================
```

Table 3 Optimized design of the specific case called "fold98updown" (with "corners" between adjacent segments, that is, no "smoothing" as described in Section 14). This optimized design was obtained with the use of the "OLD" boundary conditions: u, v, w held and rotation free along the left-hand longitudinal edge and symmetry or anti-symmetry along the right-hand longitudinal edge. (See Section 4, Fig. 2 and Figs. 6 – 8.) The thicknesses, THICK(i), i = 1, 2, ..8, are the same for all eight major segments because THICK(j), j = 2, 3, …8 are all linked to THICK(1). This linking of thicknesses is used for all of the cases explored in this paper: all the panels are of uniform thickness.

```
=====================================================================
VALUES OF DESIGN VARIABLES CORRESPONDING TO BEST FEASIBLE DESIGN
 VAR.   CURRENT
 NO.     VALUE            DEFINITION
  1    6.918E-02  wall thickness of the major segment: THICK(1 )
  2    6.918E-02  wall thickness of the major segment: THICK(2 )
  3    6.918E-02  wall thickness of the major segment: THICK(3 )
  4    6.918E-02  wall thickness of the major segment: THICK(4 )
  5    6.918E-02  wall thickness of the major segment: THICK(5 )
  6    6.918E-02  wall thickness of the major segment: THICK(6 )
  7    6.918E-02  wall thickness of the major segment: THICK(7 )
  8    6.918E-02  wall thickness of the major segment: THICK(8 )
  9    1.118E+01  projected width (x-width) of major segment: SUBWID(1 )
 10    4.790E+00  projected width (x-width) of major segment: SUBWID(2 )
 11    7.133E+00  projected width (x-width) of major segment: SUBWID(3 )
 12    3.683E+00  projected width (x-width) of major segment: SUBWID(4 )
 13    7.242E+00  projected width (x-width) of major segment: SUBWID(5 )
 14    9.932E+00  projected width (x-width) of major segment: SUBWID(6 )
 15    2.809E+00  projected width (x-width) of major segment: SUBWID(7 )
 16    2.716E+00  projected width (x-width) of major segment: SUBWID(8 )
 17    5.693E+01  half-angle (deg.) of major corrugation: PHISEG(1 )
 18    6.220E+01  half-angle (deg.) of major corrugation: PHISEG(2 )
 19    2.826E+01  half-angle (deg.) of major corrugation: PHISEG(3 )
 20    5.502E+01  half-angle (deg.) of major corrugation: PHISEG(4 )
 21    4.902E+01  half-angle (deg.) of major corrugation: PHISEG(5 )
 22    6.522E+01  half-angle (deg.) of major corrugation: PHISEG(6 )
 23    3.970E+01  half-angle (deg.) of major corrugation: PHISEG(7 )
 24    2.394E+01  half-angle (deg.) of major corrugation: PHISEG(8 )
 25    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(1 )
 26    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(2 )
 27    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(3 )
 28    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(4 )
 29    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(5 )
 30    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(6 )
```

31	7.000E+01	half-angle (deg.) of sub-corrugation: PHISUB(7)
32	7.000E+01	half-angle (deg.) of sub-corrugation: PHISUB(8)
33	3.000E+01	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(1)
34	1.312E+01	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(2)
35	1.463E+01	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(3)
36	1.046E+01	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(4)
37	6.295E+00	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(5)
38	9.305E+00	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(6)
39	5.000E+00	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(7)
40	8.789E+00	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(8)
41	7.235E+00	vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(9)
42	5.807E+01	half-angle (deg.) of overall arching: PHIBIG

MARGINS CORRESPONDING TO THE DESIGN (F.S.= FACTOR OF SAFETY)
(critical and nearly critical margins are in **bold face.**)

MAR. NO.	CURRENT VALUE	DEFINITION
1	**1.016E-01**	**6.05-0.10*V(9)-0.10*V(10)-0.10*V(11)-0.10*V(12)-0.10*V(13)-0**
2	**-1.622E-03**	**-3.95+0.10*V(9)+0.10*V(10)+0.10*V(11)+0.10*V(12)+0.10*V(13)+**
3	**1.838E-03**	**(LOCBUK(1)/LOCBUKA(1)) / LOCBUKF(1)-1; F.S.= 2.00**
4	**-2.035E-03**	**(BUKSYM(1)/BUKSYMA(1)) / BUKSYMF(1)-1; F.S.= 1.50**
5	**-6.481E-04**	**(BUKASY(1)/BUKASYA(1)) / BUKASYF(1)-1; F.S.= 1.50**
6	**9.946E-02**	**(CYLBUK(1 ,1)/CYLBUKA(1 ,1)) / CYLBUKF(1 ,1)-1; F.S.= 1.**
7	1.326E+00	(CYLBUK(1 ,2)/CYLBUKA(1 ,2)) / CYLBUKF(1 ,2)-1; F.S.= 1.
8	**7.281E-03**	**(CYLBUK(1 ,3)/CYLBUKA(1 ,3)) / CYLBUKF(1 ,3)-1; F.S.= 1.**
9	2.600E+00	(CYLBUK(1 ,4)/CYLBUKA(1 ,4)) / CYLBUKF(1 ,4)-1; F.S.= 1.
10	**3.630E-01**	**(CYLBUK(1 ,5)/CYLBUKA(1 ,5)) / CYLBUKF(1 ,5)-1; F.S.= 1.**
11	5.077E-01	(CYLBUK(1 ,6)/CYLBUKA(1 ,6)) / CYLBUKF(1 ,6)-1; F.S.= 1.
12	1.476E+00	(CYLBUK(1 ,7)/CYLBUKA(1 ,7)) / CYLBUKF(1 ,7)-1; F.S.= 1.
13	1.500E+00	(CYLBUK(1 ,8)/CYLBUKA(1 ,8)) / CYLBUKF(1 ,8)-1; F.S.= 1.
14	2.090E+00	(STRESSA(1)/STRESS(1)) / STRESSF(1)-1; F.S.= 1.50

******************* DESIGN OBJECTIVE ******************
*************   ***********

CORRESPONDING VALUE OF THE OBJECTIVE FUNCTION:

VAR. NO.	CURRENT VALUE	DEFINITION
1	9.269E+01	weight of the corrugated panel: WEIGHT

*************   ************
******************* DESIGN OBJECTIVE ******************
****

NOTE on Table 3: The optimized weight of this complexly corrugated panel with NSEG=8 major segments over WIDTH/2 = 50 inches is significantly less than the smallest weight plotted at NSEG=8 in Fig. 43 because the “OLD” boundary conditions along the left-hand longitudinal edge, used for generation of this table, are more restrictive than the “NEW” boundary conditions from which Fig. 43 was generated. (See Section 4 for definition of the “OLD” and “NEW” boundary conditions.)

Table 4 Optimized design of the specific case called "narw96updown" ("narrow" panel) with "corners" between adjacent segments (no smoothing) and factor of safety for local buckling = 1.5. The width, WIDTH, of the panel that is optimized is 50 inches, and there are 6 segments per WIDTH/2 = 25 inches, that is, 12 segments per 50 inches. Compare with Table 5.

```
==============================================================================
VALUES OF DESIGN VARIABLES CORRESPONDING TO BEST FEASIBLE DESIGN
 VAR.   CURRENT
 NO.     VALUE           DEFINITION
  1    6.016E-02  wall thickness of the major segment: THICK(1 )
  2    6.016E-02  wall thickness of the major segment: THICK(2 )
  3    6.016E-02  wall thickness of the major segment: THICK(3 )
  4    6.016E-02  wall thickness of the major segment: THICK(4 )
  5    6.016E-02  wall thickness of the major segment: THICK(5 )
  6    6.016E-02  wall thickness of the major segment: THICK(6 )
  7    7.185E+00  projected width (x-width) of major segment: SUBWID(1 )
  8    7.484E+00  projected width (x-width) of major segment: SUBWID(2 )
  9    1.368E+00  projected width (x-width) of major segment: SUBWID(3 )
 10    1.192E+00  projected width (x-width) of major segment: SUBWID(4 )
 11    2.138E+00  projected width (x-width) of major segment: SUBWID(5 )
 12    5.191E+00  projected width (x-width) of major segment: SUBWID(6 )
 13    5.557E+01  half-angle (deg.) of major corrugation: PHISEG(1 )
 14    7.596E+01  half-angle (deg.) of major corrugation: PHISEG(2 )
 15    3.037E+01  half-angle (deg.) of major corrugation: PHISEG(3 )
 16    1.216E+01  half-angle (deg.) of major corrugation: PHISEG(4 )
 17    7.712E+01  half-angle (deg.) of major corrugation: PHISEG(5 )
 18    4.415E+01  half-angle (deg.) of major corrugation: PHISEG(6 )
 19    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(1 )
 20    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(2 )
 21    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(3 )
 22    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(4 )
 23    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(5 )
 24    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(6 )
 25    3.000E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(1 )
 26    2.005E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(2 )
 27    9.076E+00  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(3 )
 28    1.154E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(4 )
 29    1.104E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(5 )
 30    1.015E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(6 )
 31    5.196E+00  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(7 )
 32    8.095E+01  half-angle (deg.) of overall arching: PHIBIG
```

MARGINS CORRESPONDING TO THE DESIGN (F.S.= FACTOR OF SAFETY)
(critical margins are in bold face.)

```
 MAR.   CURRENT
 NO.     VALUE            DEFINITION
  1    9.421E-02  3.55-0.10*V(7)-0.10*V(8)-0.10*V(9)-0.10*V(10)-0.10*V(11)-0.1
  2    5.794E-03  -1.45+0.10*V(7)+0.10*V(8)+0.10*V(9)+0.10*V(10)+0.10*V(11)+0.
  3    8.471E-02  (LOCBUK(1 )/LOCBUKA(1 )) / LOCBUKF(1 )-1; F.S.=  1.50
  4   -7.064E-03  (BUKSYM(1 )/BUKSYMA(1 )) / BUKSYMF(1 )-1; F.S.=  1.50
  5   -9.445E-03  (BUKASY(1 )/BUKASYA(1 )) / BUKASYF(1 )-1; F.S.=  1.50
  6    4.371E-01  (CYLBUK(1 ,1 )/CYLBUKA(1 ,1 )) / CYLBUKF(1 ,1 )-1; F.S.=  1.
  7    4.799E-01  (CYLBUK(1 ,2 )/CYLBUKA(1 ,2 )) / CYLBUKF(1 ,2 )-1; F.S.=  1.
  8    1.473E+00  (CYLBUK(1 ,3 )/CYLBUKA(1 ,3 )) / CYLBUKF(1 ,3 )-1; F.S.=  1.
  9    1.922E+00  (CYLBUK(1 ,4 )/CYLBUKA(1 ,4 )) / CYLBUKF(1 ,4 )-1; F.S.=  1.
 10    6.479E+00  (CYLBUK(1 ,5 )/CYLBUKA(1 ,5 )) / CYLBUKF(1 ,5 )-1; F.S.=  1.
 11    5.013E-01  (CYLBUK(1 ,6 )/CYLBUKA(1 ,6 )) / CYLBUKF(1 ,6 )-1; F.S.=  1.
 12    2.035E+00  (STRESSA(1 )/STRESS(1 )) / STRESSF(1 )-1; F.S.=  1.50


 ******************** DESIGN OBJECTIVE *******************
 *************                             ***********
  CORRESPONDING VALUE OF THE OBJECTIVE FUNCTION:
 VAR.   CURRENT
 NO.     VALUE            DEFINITION
  1    4.552E+01  weight of the corrugated panel: WEIGHT

 *************                          ************
 ******************** DESIGN OBJECTIVE *******************
==================================================================
```

NOTE: The objective, 45.52 lb, is the weight of the panel of LENGTH = 100 inches and WIDTH = 50 inches. **The optimized weight, 2 x 45.52 = 91.04 lb, of the corresponding 100 x 100 inch complexly corrugated panel** is slightly smaller than the smallest weight among all of the data points plotted in Fig. 46 (See Table 5.) The weight, 91.04 lb, is about 14 per cent lower than the minimum weight, 106.5 lb, plotted for the optimized uniformly corrugated panel. (See the open square data point in Fig. 46 plotted for the “Number of major segments spanning 50 inches” = 10.)

Table 5 Optimized design of the specific case called "narw96updown" ("narrow" panel) with smoothing between adjacent segments as described in Section 14 and factor of safety for local buckling = 1.5. The width, WIDTH, of the panel that is optimized is 50 inches, and there are 6 segments per WIDTH/2 = 25 inches, that is, 12 segments per 50 inches.

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VALUES OF DESIGN VARIABLES CORRESPONDING TO BEST FEASIBLE DESIGN
 VAR.   CURRENT
 NO.     VALUE            DEFINITION
  1    6.252E-02  wall thickness of the major segment: THICK(1 )
  2    6.252E-02  wall thickness of the major segment: THICK(2 )
  3    6.252E-02  wall thickness of the major segment: THICK(3 )
  4    6.252E-02  wall thickness of the major segment: THICK(4 )
  5    6.252E-02  wall thickness of the major segment: THICK(5 )
  6    6.252E-02  wall thickness of the major segment: THICK(6 )
  7    6.850E+00  projected width (x-width) of major segment: SUBWID(1 )
  8    7.722E+00  projected width (x-width) of major segment: SUBWID(2 )
  9    1.693E+00  projected width (x-width) of major segment: SUBWID(3 )
 10    1.434E+00  projected width (x-width) of major segment: SUBWID(4 )
 11    1.478E+00  projected width (x-width) of major segment: SUBWID(5 )
 12    5.390E+00  projected width (x-width) of major segment: SUBWID(6 )
 13    6.679E+01  half-angle (deg.) of major corrugation: PHISEG(1 )
 14    7.381E+01  half-angle (deg.) of major corrugation: PHISEG(2 )
 15    2.340E+01  half-angle (deg.) of major corrugation: PHISEG(3 )
 16    1.394E+01  half-angle (deg.) of major corrugation: PHISEG(4 )
 17    7.042E+01  half-angle (deg.) of major corrugation: PHISEG(5 )
 18    4.489E+01  half-angle (deg.) of major corrugation: PHISEG(6 )
 19    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(1 )
 20    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(2 )
 21    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(3 )
 22    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(4 )
 23    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(5 )
 24    7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(6 )
 25    3.000E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(1 )
 26    1.954E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(2 )
 27    9.471E+00  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(3 )
 28    1.241E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(4 )
 29    1.157E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(5 )
 30    1.115E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(6 )
 31    5.938E+00  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(7 )
 32    7.566E+01  half-angle (deg.) of overall arching: PHIBIG

 MARGINS CORRESPONDING TO THE DESIGN (F.S.= FACTOR OF SAFETY)
(Critical and near-critical margins are in bold face.)
 MAR.   CURRENT
 NO.     VALUE           DEFINITION
```

```
 1     9.332E-02  3.55-0.10*V(7)-0.10*V(8)-0.10*V(9)-0.10*V(10)-0.10*V(11)-0.1
 2     6.678E-03  -1.45+0.10*V(7)+0.10*V(8)+0.10*V(9)+0.10*V(10)+0.10*V(11)+0.
 3     1.171E-01  (LOCBUK(1 )/LOCBUKA(1 )) / LOCBUKF(1 )-1; F.S.=  1.50
 4    -2.984E-03  (BUKSYM(1 )/BUKSYMA(1 )) / BUKSYMF(1 )-1; F.S.=  1.50
 5    -7.739E-03  (BUKASY(1 )/BUKASYA(1 )) / BUKASYF(1 )-1; F.S.=  1.50
 6     1.162E+00  (CYLBUK(1 ,1 )/CYLBUKA(1 ,1 )) / CYLBUKF(1 ,1 )-1; F.S.=  1.
 7     6.333E-01  (CYLBUK(1 ,2 )/CYLBUKA(1 ,2 )) / CYLBUKF(1 ,2 )-1; F.S.=  1.
 8     5.056E-01  (CYLBUK(1 ,3 )/CYLBUKA(1 ,3 )) / CYLBUKF(1 ,3 )-1; F.S.=  1.
 9     1.803E+00  (CYLBUK(1 ,4 )/CYLBUKA(1 ,4 )) / CYLBUKF(1 ,4 )-1; F.S.=  1.
10     9.992E+00  (CYLBUK(1 ,5 )/CYLBUKA(1 ,5 )) / CYLBUKF(1 ,5 )-1; F.S.=  1.
11     5.194E-01  (CYLBUK(1 ,6 )/CYLBUKA(1 ,6 )) / CYLBUKF(1 ,6 )-1; F.S.=  1.
12     2.039E+00  (STRESSA(1 )/STRESS(1 )) / STRESSF(1 )-1; F.S.=  1.50

***************************************************
******************** DESIGN OBJECTIVE *******************
*************                             ***********
 CORRESPONDING VALUE OF THE OBJECTIVE FUNCTION:
VAR.   CURRENT
NO.     VALUE            DEFINITION
 1    4.558E+01  weight of the corrugated panel: WEIGHT

*************                          ************
******************** DESIGN OBJECTIVE *******************
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NOTE: The objective, 45.58 lb, is the weight of the panel of LENGTH = 100 inches and WIDTH = 50 inches. **The value plotted in Fig. 46 equals 2 x 45.58 = 91.16 lb, corresponding to a panel of width = 100 inches.** (See the solid circular data point in Fig. 46 plotted for the “Number of major segments spanning 50 inches” = 12.) The optimized weight, 91.16 lb, of this 100 x 100 inch complexly corrugated panel is the smallest weight among all of the data points plotted in Fig. 46. The weight, 91.16 lb, is about 14 per cent lower than the minimum weight, 106.5 lb, plotted for the optimized uniformly corrugated panel. (See the open square data point in Fig. 46 plotted for the “Number of major segments spanning 50 inches” = 10.)

Table 6 Optimized design of the specific case called "narw91updown" ("narrow" panel) with smoothing between adjacent segments as described in Section 14 and factor of safety for local buckling = 1.5. The width, WIDTH, of the panel that is optimized is 11.11111 inches, and there is only one segment per WIDTH/2 = 5.555556 inches, that is, 9 segments per 50 inches.

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VALUES OF DESIGN VARIABLES CORRESPONDING TO BEST FEASIBLE DESIGN
 VAR.   CURRENT
 NO.     VALUE             DEFINITION
  1     6.461E-02  wall thickness of the major segment: THICK(1 )
  2     5.556E+00  projected width (x-width) of major segment: SUBWID(1 )
  3     4.527E+01  half-angle (deg.) of major corrugation: PHISEG(1 )
  4     7.000E+01  half-angle (deg.) of sub-corrugation: PHISUB(1 )
  5     3.000E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(1 )
  6     3.449E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(2 )
  7     1.000E-01  half-angle (deg.) of overall arching: PHIBIG

 MARGINS CORRESPONDING TO THE DESIGN (F.S.= FACTOR OF SAFETY)
(Critical margins are in bold face.)
 MAR.   CURRENT
 NO.     VALUE             DEFINITION
  1     6.732E-03  (LOCBUK(1 )/LOCBUKA(1 )) / LOCBUKF(1 )-1; F.S.=  1.50
  2    -3.979E-04  (BUKSYM(1 )/BUKSYMA(1 )) / BUKSYMF(1 )-1; F.S.=  1.50
  3    -1.521E-03  (BUKASY(1 )/BUKASYA(1 )) / BUKASYF(1 )-1; F.S.=  1.50
  4     5.963E-01  (CYLBUK(1 ,1 )/CYLBUKA(1 ,1 )) / CYLBUKF(1 ,1 )-1; F.S.=  1.
  5     2.081E+00  (STRESSA(1 )/STRESS(1 )) / STRESSF(1 )-1; F.S.=  1.50

******************** DESIGN OBJECTIVE *******************
CORRESPONDING VALUE OF THE OBJECTIVE FUNCTION:
 VAR.   CURRENT
 NO.     VALUE             DEFINITION
  1     1.027E+01  weight of the corrugated panel: WEIGHT

******************** DESIGN OBJECTIVE *******************
======================================================================
```

NOTE: The objective, 10.27 lb, is the weight of the panel of LENGTH = 100 inches and WIDTH = 11.11111 inches. **The value plotted in Fig. 46 equals 9 x 10.27 = 92.43 lb, corresponding to a panel of width = 100 inches**. (See the solid square data point in Fig. 46 plotted for the "Number of major segments spanning 50 inches" = 9.) The optimized weight, 92.43 lb, of this 100 x 100 inch corrugated panel is the smallest weight among all of the solid square data points plotted in Fig. 46 for which optimization was performed with use of a one-segment model. See Fig. 54. There are only 3 decision variables in the specific case, narw91updown:

```
  1     6.461E-02  wall thickness of the major segment: THICK(1 )
  3     4.527E+01  half-angle (deg.) of major corrugation: PHISEG(1 )
  6     3.449E+01  vertical y above (x,y,z) origin if PHIBIG=0: YPLATE(2 )
```