CALCULATION OF STRESS IN THE WT 10.5 X 73.5

The stress in the T-beam was investigated with two approaches. The first was to use a finite element program that was setup to simulate all point loads, moments, actual beam weight, and end restraints. The second method looked at the beam as both a simply supported beam with uniform load and also as a fixed supported beam with a uniform load. Knowing that the actual beam falls between these two beam cases, approximate maximum stresses would be generated from the worst of the two; the simply supported case.

To setup the finite element problem with appropriate loads, the nine locations on the T-beam needed to be located and forces at these locations needed to be determined. Knowing the geometry and material properties of the scintillator, a finite element model of the scintillator was created so that loads at the support points could be known and transferred to the T-beam. Loads from miscellaneous parts as well as the unistrut stringers were also added to the total load. The enclosed section marked "Determining Loads" may help to clarify this procedure. With all of the loads known, the finite element model of the T-beam was created to determine deflections and stresses.

The finite element solution is attached on the following pages. The maximum combined stress was found to be 12,300 psi with a max deflection of -.286 inches.

The MathCad generated solutions for the fixed and simply supported beam are also attached. The maximum stress in the simply supported case is 9,355 psi with a max deflection of -.391 inches. The allowable stress is 16,657 psi which can also be used for the finite element solution. The max deflection in the fixed supported case is -.078 inches. As expected, the finite solution for deflection came out in between the two beam cases that were computed with straight forward equations. The combined stress on the beam, as computed by the finite element program, came out higher than either of the two hand calculated cases probably because the loading in the finite case included large moments that were ignored during hand calculations.

The side mounted, cantilevered support arms for the T-beam are designed to withstand the total load of the T-beam, scintillators, and all mounting brackets. The maximum stress on this short beam is 18,446 psi and it is below the allowable stress of 23,760 psi. The finite analysis of this support arm is also attached in this section.

CONCLUSION:

The maximum deflections in the beam and support arms are tolerable and adjustment measures have been designed to correct misalignment of the scintillators when deflections does occur.

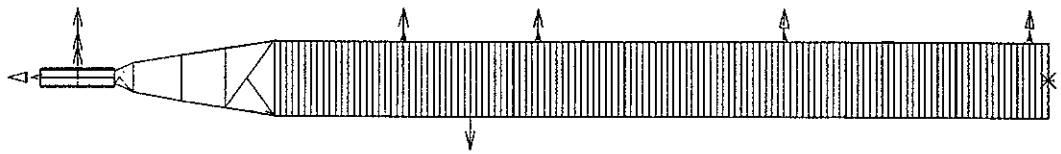
The maximum stress of all members is below the allowable stress and adheres to AISC codes.

SDRC I-DEAS VI: FE_Modeling_&_Analysis 12-AUG-92 08:37:51

Database: cdf_beam
View : No stored View
Task: Boundary Conditions
Model: 2-INSIDE_SCINT

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 8-WORKING_SETS

Inner Scintillator



25.14#

Total Weight = 109.47#

SDRC I-DEAS VI: FE_Modeling_&_Analysis

12-AUG-92 09:30:31

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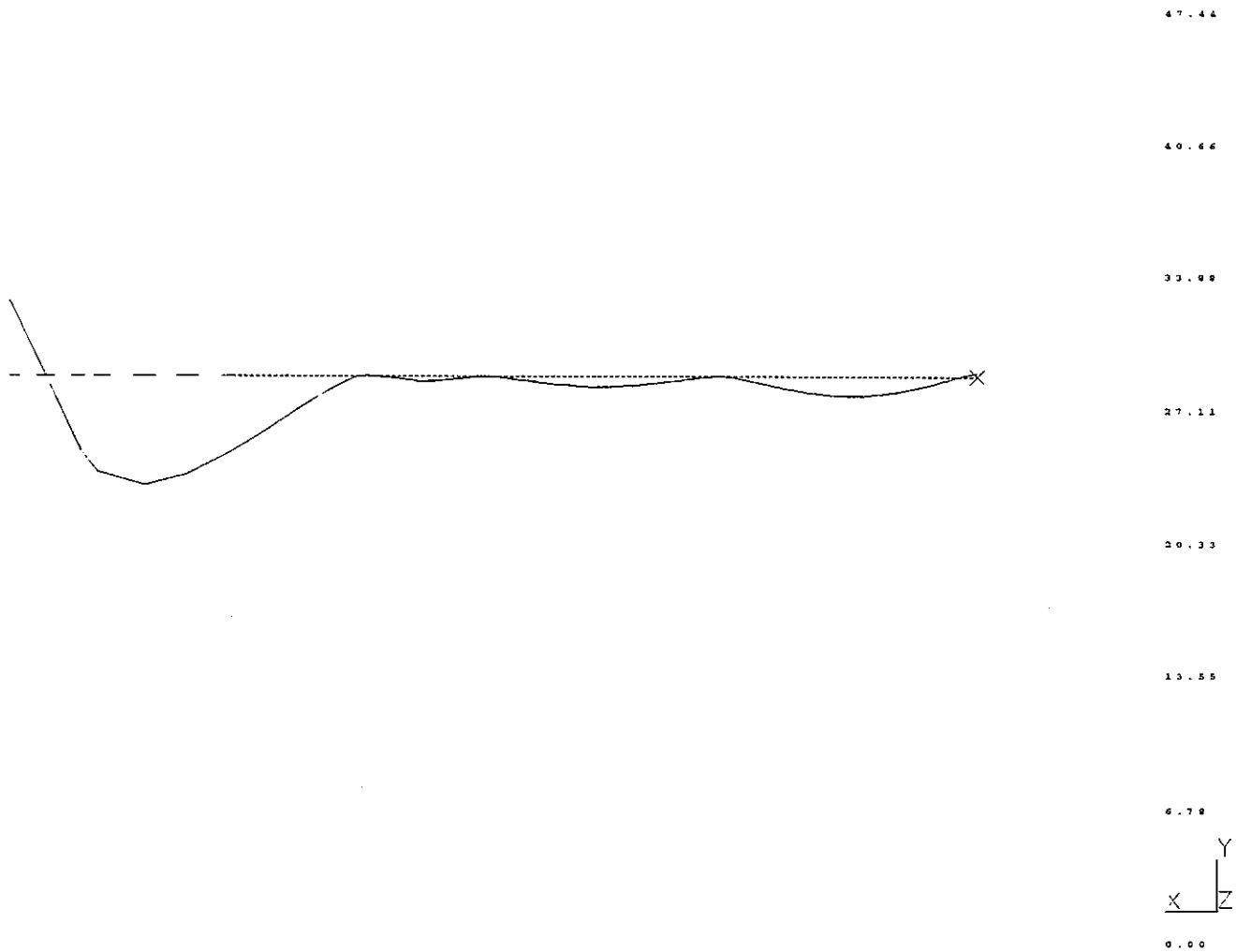
View : No stored View
Task: Post Processing
Model: 2-INSIDE_SCENT

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 8-WORKING_SET8

cdf_beam

LOAD SET: 2 - LOAD SET 2
FRAME OF REF: GLOBAL
REACTION - MAG MIN: 0.00 MAX: 47.44



SDRC I-DEAS VI: FE_Modeling_&_Analysis 12-AUG-92 09:29:16

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Task: Post Processing
Model: 2-INSIDE_SCHNT

Units : IN
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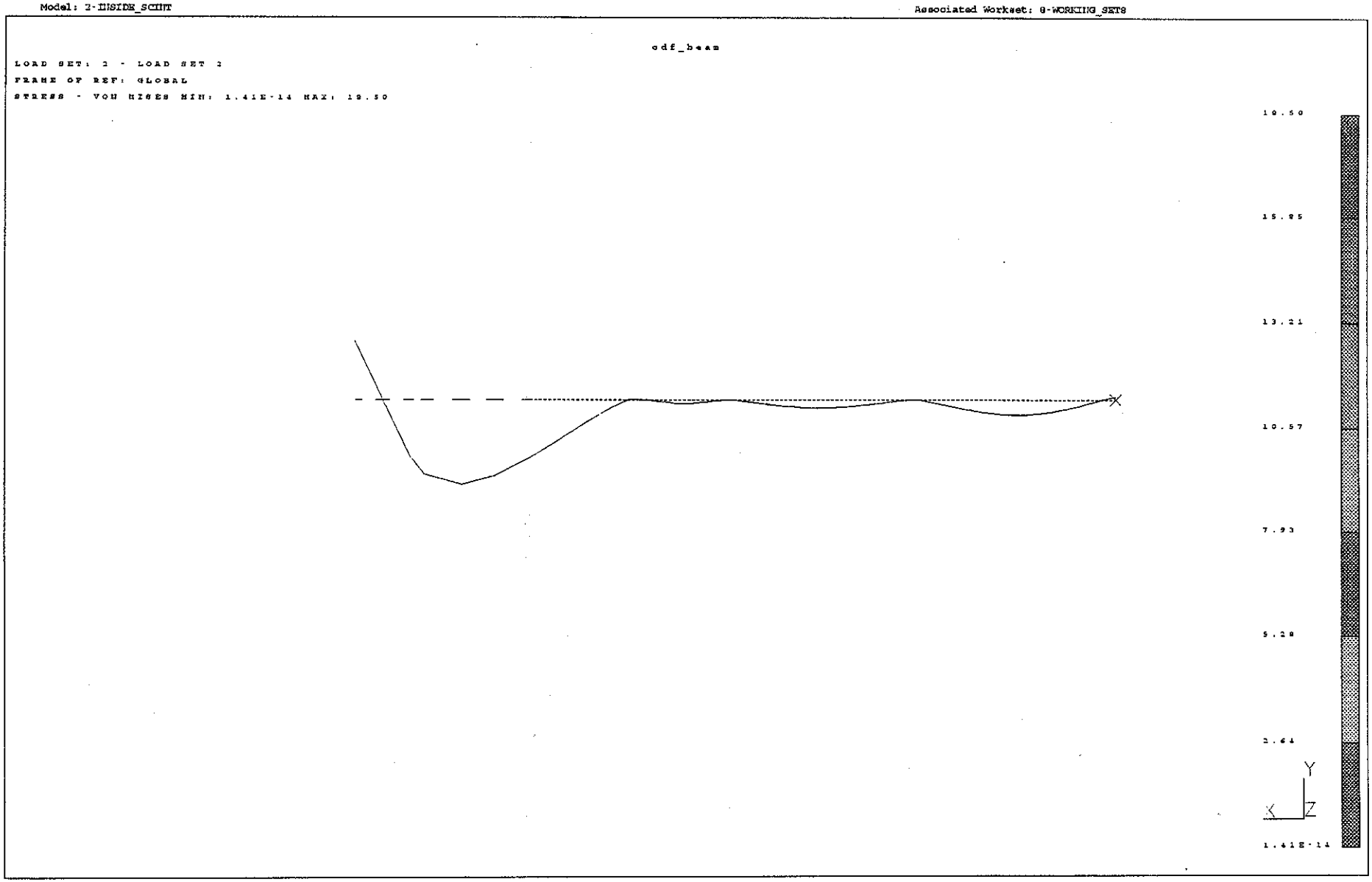

SDRC I-DEAS VI: FE_Modeling_&_Analysis 12-AUG-92 09:28:14

Database: cdf_beam
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Task: Post Processing
Model: 2-INSIDE_SCHNT

Units : IN
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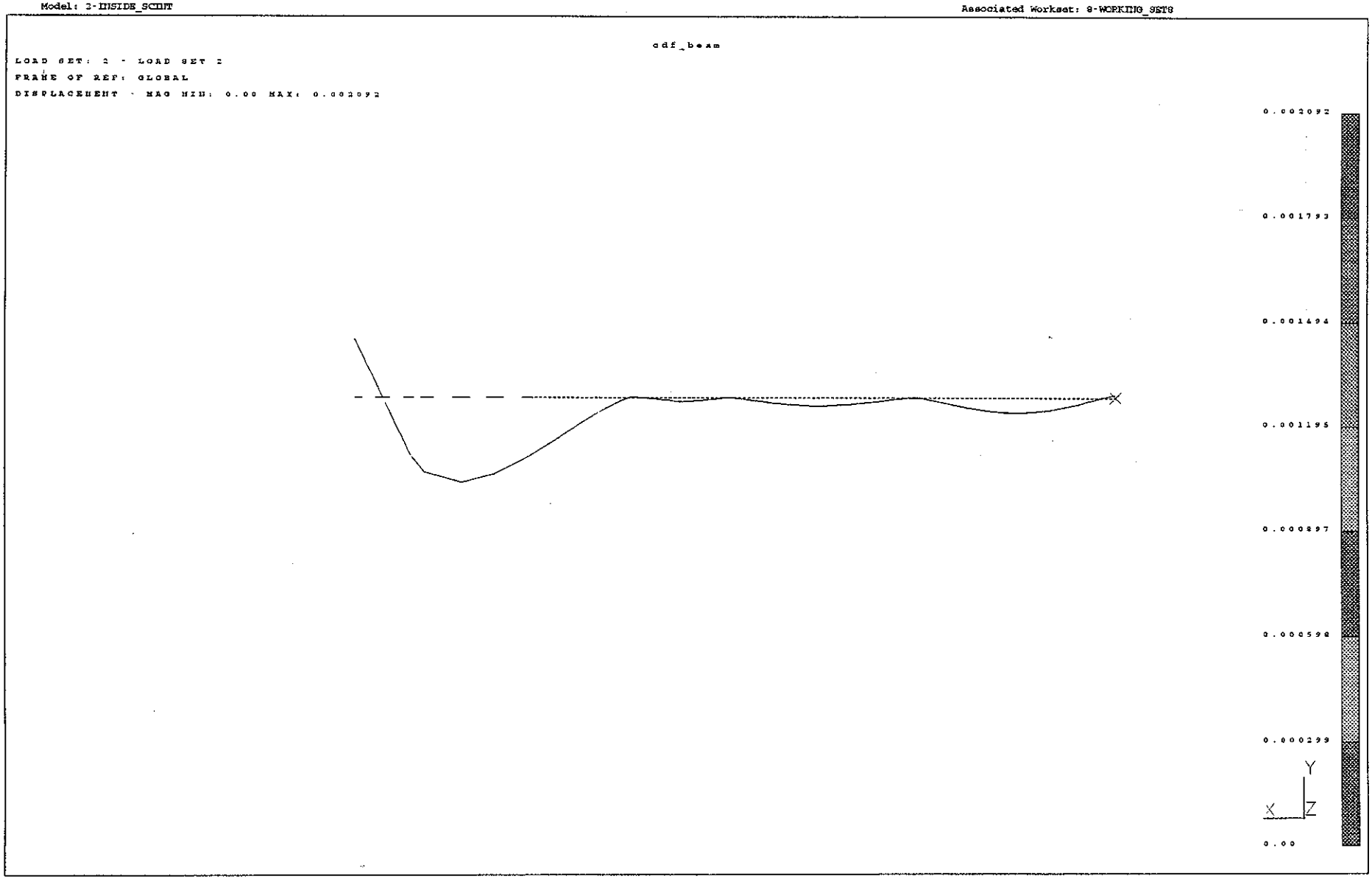
Associated Workset: 9-WORKING_SETS



1

SDRC I-DEAS VI: FE_Modeling_&_Analysis 12-AUG-92 09:33:08
cdf_beam
Reaction Loads for Each Scintillator (Inner)

Group ID : No stored PERMANENT GROUP
Analysis Dataset : 5 - CASE 2,LOAD 2,REACTION FORCES
Report Type : Contour Units : IN
Dataset Type : Reaction Forces Load Set : 2
Frame of Reference: Global Data Component: Magnitude

Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.269E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
44	0.000E+00	3.022E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00

45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
46	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
47	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
48	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

1

SDRC I-DEAS VI: FE_Modeling_&_Analysis 12-AUG-92 09:33:08
cdf_beam
Reaction Loads for Each Scintillator (Inner)

Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
49	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
51	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
52	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
53	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
54	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
55	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
56	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
57	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
58	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
59	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
60	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
61	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
62	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
63	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
64	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
65	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
66	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
67	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
68	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
70	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
71	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
72	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
73	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
74	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
75	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
76	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
77	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
78	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
79	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
81	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
84	0.000E+00	2.509E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
87	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
91	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
92	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
94	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

95	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
98	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
99	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

1

SDRC I-DEAS VI: FE_Modeling_&_Analysis 12-AUG-92 09:33:08
cdf_beam
Reaction Loads for Each Scintillator (Inner)

Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
103	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
105	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
106	0.000E+00	4.744E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
107	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
108	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
109	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
110	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
111	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
112	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
113	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
114	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
115	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
116	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
117	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
118	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
119	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
121	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
122	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
123	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
124	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
125	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
127	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
128	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
129	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
130	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
131	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
132	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
133	0.000E+00	1.918E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	1.346E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	1	106	1	1	1	1
Maximum	0.000E+00	4.744E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	1	1	1	1	1	1
Minimum	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Average	0.000E+00	1.012E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

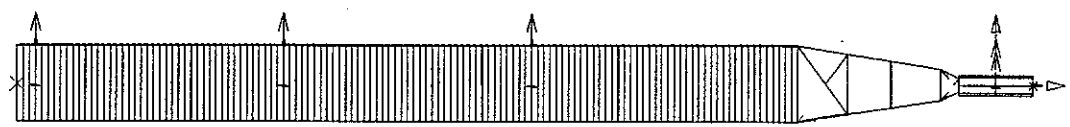
SDRC I-DEAS VI: FE_Modeling_&_Analysis

11-AUG-92 15:56:38

Database: cdf_beam
View : No stored View
Task: Boundary Conditions
Model: 1-FE MODEL1

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 1-WORKING_SET1

Outer Scintillator



Total Weight = 109.47#

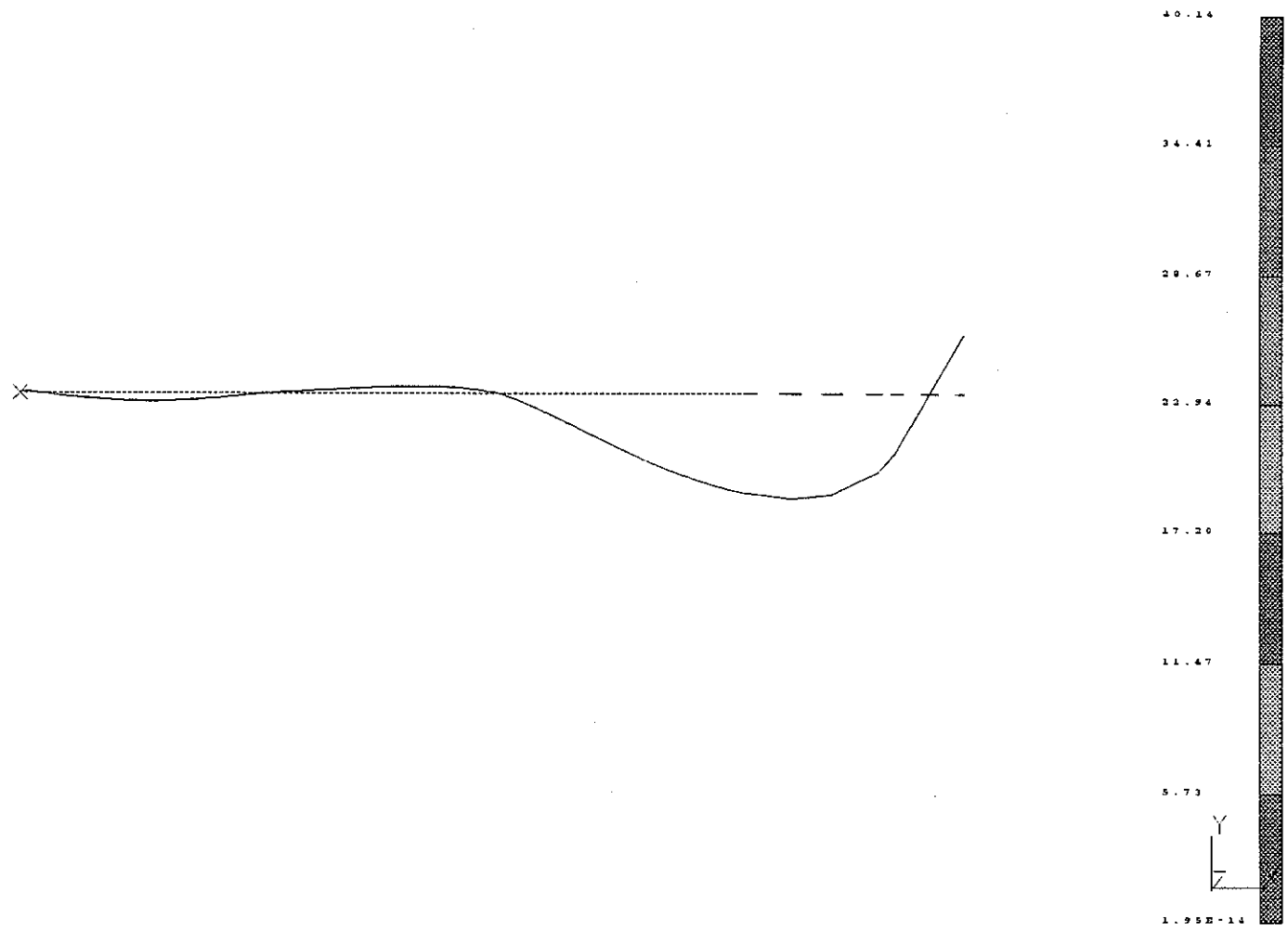
SDRC I-DEAS VI: FE_Modeling_&_Analysis 11-AUG-92 16:02:28

Database: cdf_beam
View : No stored View
Task: Post Processing
Model: 1-FE MODEL1

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 1-WORKING_SET1

cdf_beam

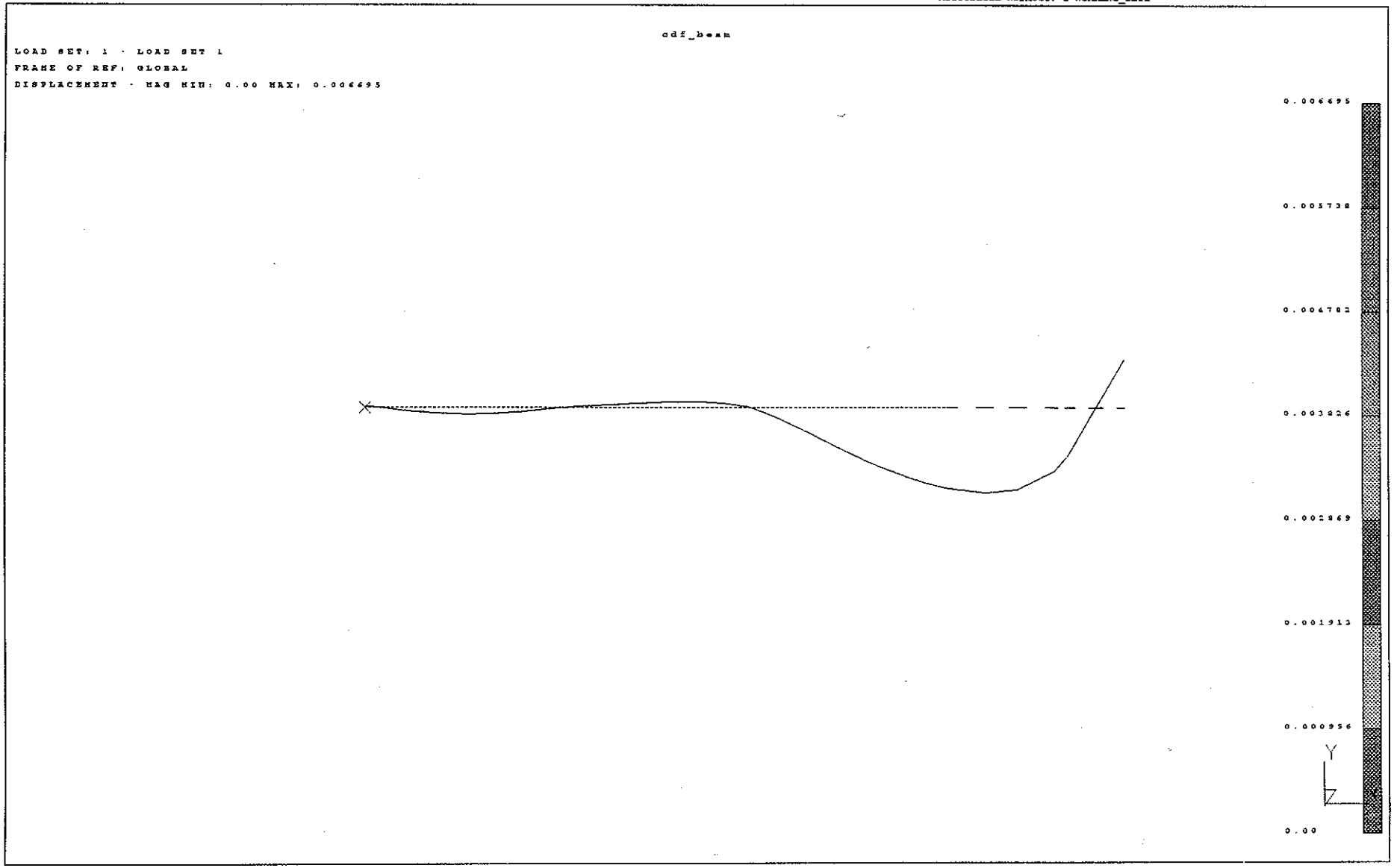
LOAD SET: 1 - LOAD SET 1
FRAME OF REF: GLOBAL
STRESS - VON MISES MIN: 1.95E-14 MAX: 40.14



SDRC I-DEAS VI: FE_Modeling_&_Analysis 11-AUG-92 16:02:06

Database: cdf_beam
View : No stored View
Task: Post Processing
Model: 1-FE MODEL1

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 1-WORKING_SET1



SDRC I-DEAS VI: FE_Modeling_&_Analysis 11-AUG-92 16:07:43
cdf_beam
Reaction Loads for Each Scintillator (forward)

Group ID : No stored PERMANENT GROUP
Analysis Dataset : 2 - CASE 1,LOAD 1,REACTION FORCES
Report Type : Contour Units : IN
Dataset Type : Reaction Forces Load Set : 1
Frame of Reference: Global Data Component: Magnitude

Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	0.000E+00	1.431E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
33	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
35	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
36	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
38	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
39	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
40	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
41	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
42	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
43	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
44	0.000E+00	1.898E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00

45	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
46	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
47	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
48	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

1

SDRC I-DEAS VI: FE_Modeling_&_Analysis 11-AUG-92 16:07:43
cdf_beam
Reaction Loads for Each Scintillator (forward)

Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
49	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
51	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
52	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
53	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
54	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
55	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
56	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
57	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
58	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
59	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
60	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
61	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
62	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
63	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
64	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
65	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
66	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
67	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
68	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
69	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
70	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
71	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
72	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
73	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
74	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
75	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
76	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
77	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
78	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
79	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
80	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
81	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
82	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
83	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
84	0.000E+00	5.104E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
85	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
86	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
87	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
88	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
89	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
90	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
91	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
92	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
93	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
94	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

95	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
96	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
97	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
98	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
99	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
100	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
101	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
102	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

1

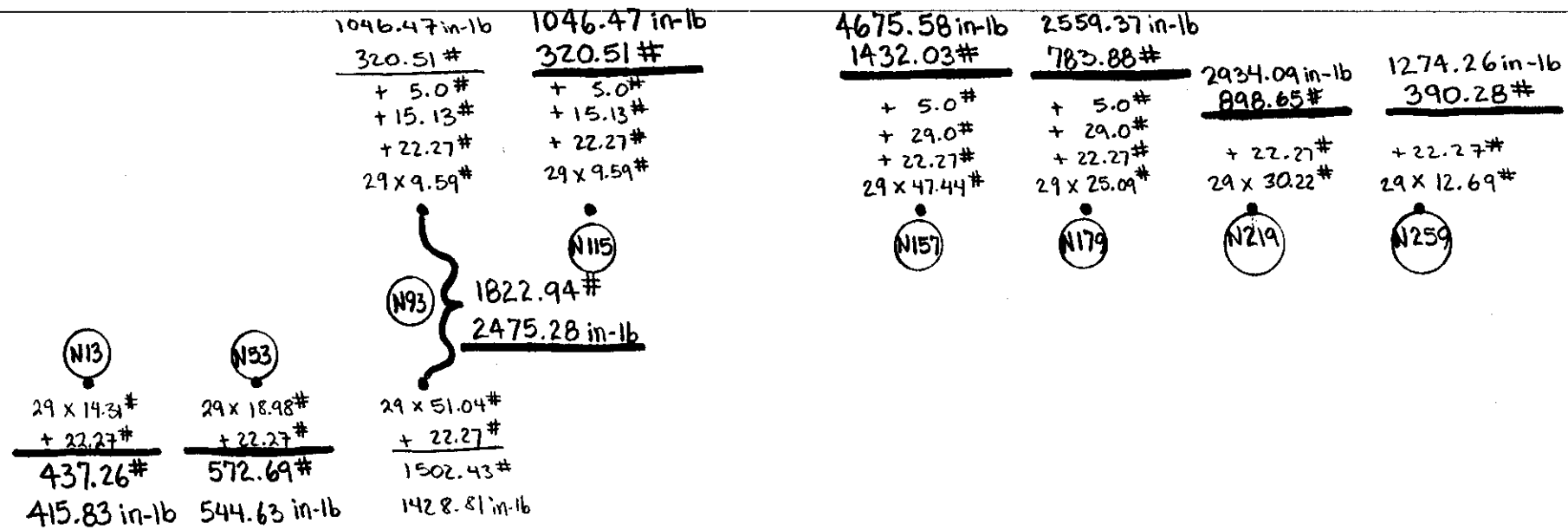
SDRC I-DEAS VI: FE_Modeling_&_Analysis 11-AUG-92 16:07:43
cdf_beam
Reaction Loads for Each Scintillator (forward)

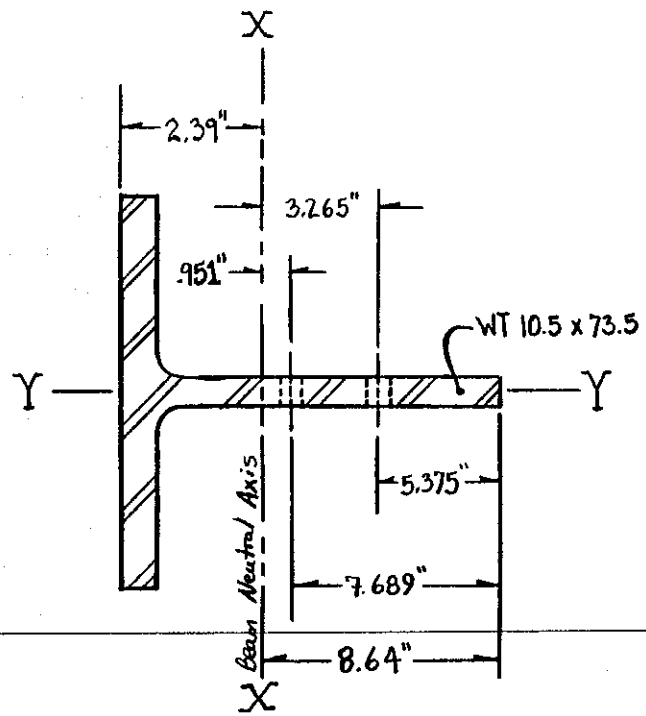
Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
103	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
104	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
105	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
106	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
107	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
108	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
109	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
110	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
111	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
112	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
113	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
114	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
115	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
116	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
117	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
118	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
119	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
120	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
121	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
122	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
123	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
124	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
125	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
126	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
127	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
128	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
129	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
130	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
131	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
132	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
133	0.000E+00	2.514E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	1.095E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	1	84	1	1	1	1
Maximum	0.000E+00	5.104E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00
	1	1	1	1	1	1
Minimum	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Average	0.000E+00	8.231E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CDF: Muon Wall Scintillator Support Scheme

Loading Summary of T-beam

Don Mitchell 11 AUG 92





Additional Loads:

Unistrut, P3300 : $(.78\#/ft)(342.75\,in)(\frac{1}{12}\,ft/in) = 22.27\#$ per stringer

2x2x1/2 AL Angle x 22" LG : $(29\text{ pieces})(.484\,in^2)(22\,in)(.098\#/in^3) = 30.26\#$

PM Support Hook : $(2\#)(29) = 58\#$

Circular Clamps : $(2)(.172\#)(29) = 10.0\#$

NOTE: Node Locations shown above represent individual Unistrut stringer locations.

SDRC I-DEAS VI: FE_Modeling_&_Analysis

12-AUG-92 11:46:53

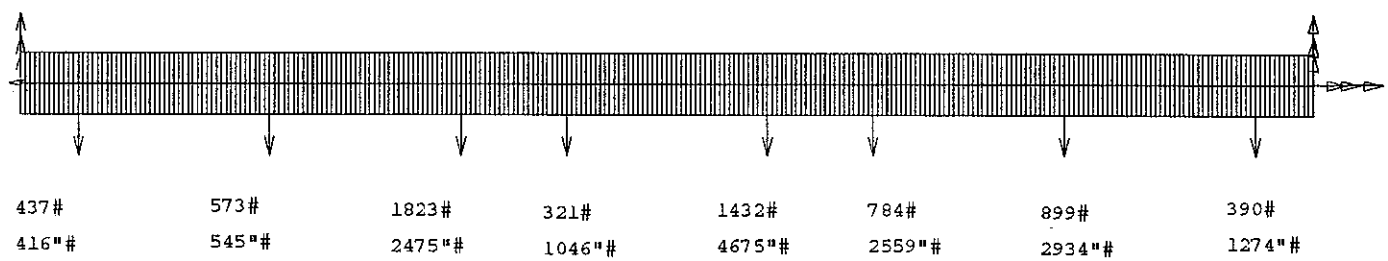
Database: cdf_beam
View : No stored View
Task: Boundary Conditions
Model: 3-TEE BEAM

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 9-WORKING_SET9

CDF MUON WALL, SCINTILLATOR SUPPORT BEAM

WT 10.5x73.5

Length = 270"



Max deflection: -.286 in @ center

SDRC I-DEAS VI: FE_Modeling_&_Analysis

18-AUG-92 11:03:00

Database: cdf_beam

View : No stored View

Task: Boundary Conditions

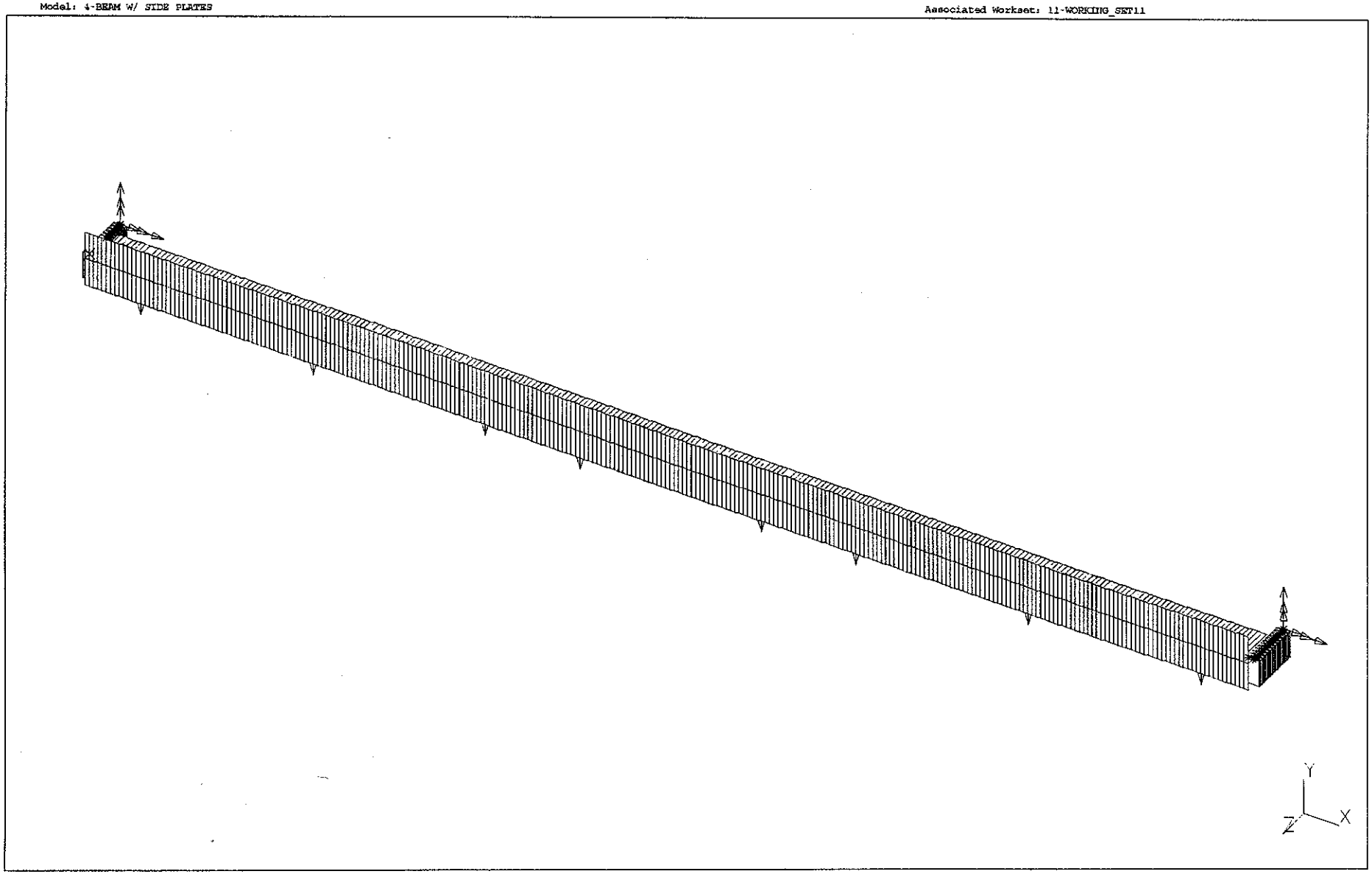
Model: 4-BEAM W/ SIDE PLATES

Units : IN

Display : No stored Option

Model Bin: 1-MAIN

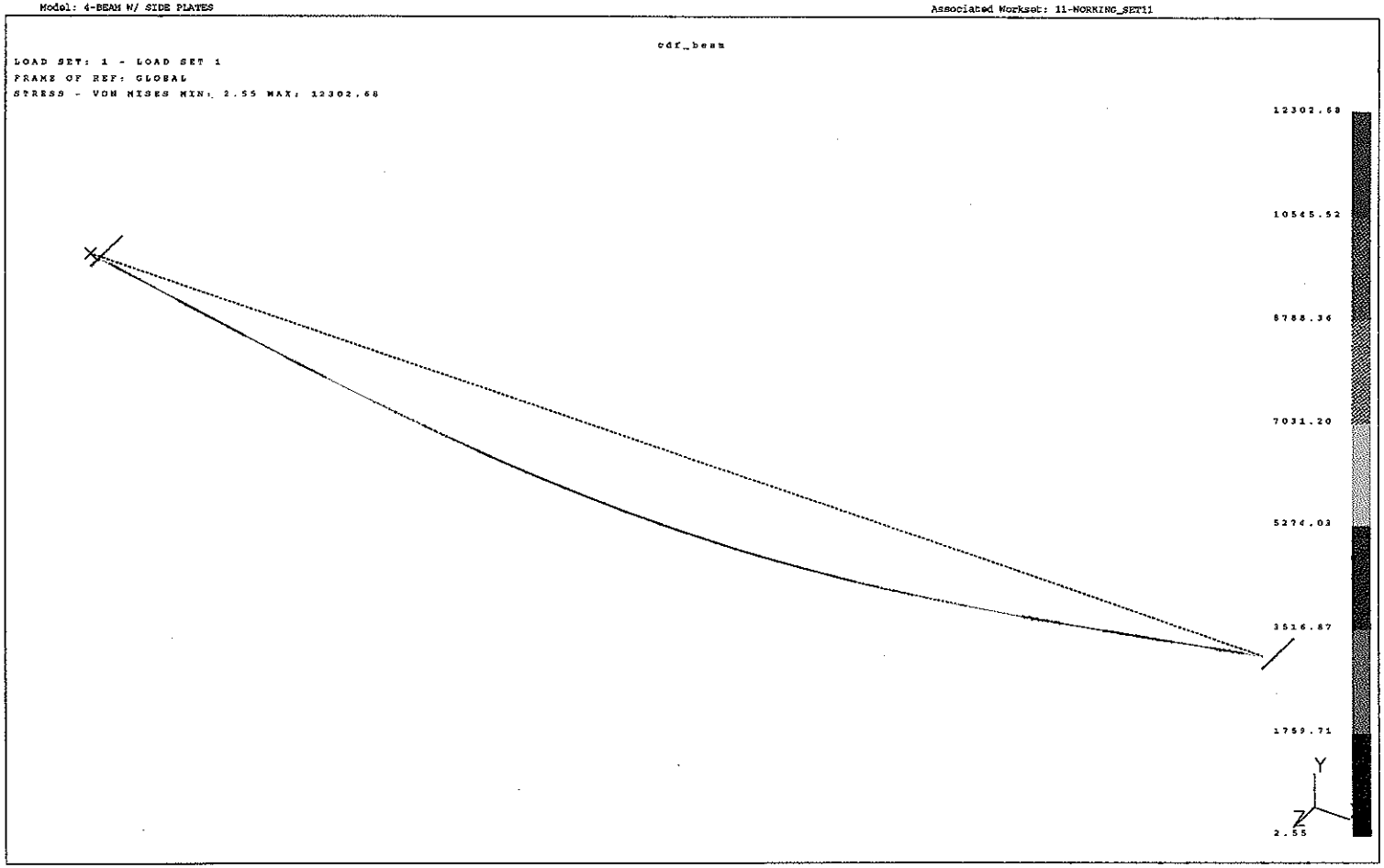
Associated Workset: 11-WORKING_SET11



SDRC I-DEAS VI: FE_Modeling_&_Analysis 18-AUG-92 11:04:57

Database: cdf_beam
View : No stored View
Task: Post Processing
Model: 4-BEAM W/ SIDE PLATES

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 11-WORKING_SET11



SDRC I-DEAS VI: FE_Modeling_&_Analysis 18-AUG-92 11:09:11
cdf_beam

Group ID : No stored PERMANENT GROUP
Analysis Dataset : 8 - CASE 2,LOAD 1,REACTION FORCES
Report Type : Contour Units : IN
Dataset Type : Reaction Forces Load Set : 1
Frame of Reference: Global Data Component: Magnitude

	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
Total	0.000E+00	8.428E+03	-5.588E-08	-8.448E+04	-1.261E+01	1.365E+02
	295	295	295	1	295	295
Maximum	6.718E+03	4.215E+03	4.670E-02	0.000E+00	5.751E+04	1.078E+05
	319	1	319	295	319	319
Minimum	-6.718E+03	0.000E+00	-4.670E-02	-4.366E+04	-5.752E+04	-1.076E+05
Average	0.000E+00	2.642E+01	-1.752E-10	-2.648E+02	-3.952E-02	4.280E-01

Beam Type:
WT 10.5x73.5

Simple Support
Uniform Load

Don Mitchell 6/28/93

$E := 29000000$ $I := 188$ $S := 30$ $l := 270$ $x := 0..l$

$w := 30.8$ $bf := 1.15$

$z := 1.739$ (z = d/Af)

$rt := 2.9$ (let rt = .01 for channels)

$Lb := 270$ (unsupported Length)

$mid := \frac{l}{2} + 1$

Moment Calculation:

$$M_x := \frac{w \cdot x}{2} \cdot (l - x)$$

Max Moment:

$M_{mid} = 280649.6$

Deflection Calculation:

$$y_x := \frac{w \cdot x}{24 \cdot E \cdot I} \cdot \left(2 \cdot l \cdot x^2 - x^3 - l^3\right)$$

$$ymax := \frac{-\left(5 \cdot w \cdot l^4\right)}{384 \cdot E \cdot I}$$

$ymax = -0.3909207$

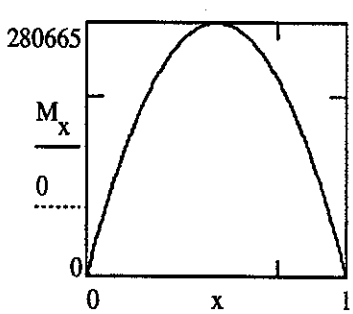
Stress Calculation:

$$\sigma_x := \frac{M_x}{S}$$

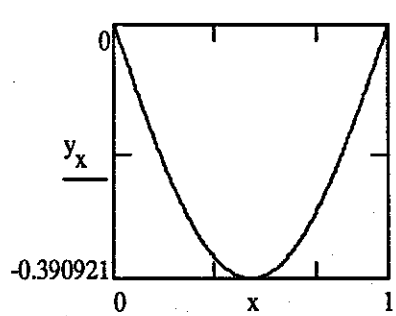
Max Stress:

$\sigma_{mid} = 9354.9866667$ psi

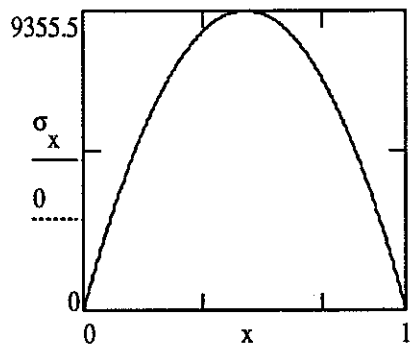
Moments



Deflections



Stress



Calculate the allowable stress of the beam

$Fy := 36$ KSI (yield strength of steel) $Fb := .66 \cdot Fy$

Calculate the Lc value (max unsupported length such that Fb = .66 Fy)

$Lc1 := \frac{76 \cdot bf}{\sqrt{Fy}}$ $Lc2 := \frac{20000}{z \cdot Fy}$ $Lc := \begin{pmatrix} Lc1 \\ Lc2 \end{pmatrix}$ $Lc := sort(Lc)_{0,0}$

$Lc = 14.5666667$

$Lb = 270$

If Lb < Lc, then
Fb = .66 Fy

if so, $Fb = 23.76$ Ksi

Three Equations are given to calculate the allowable stress. Given the criterion, the value of Fb can be found. Equation F1-8 will be used when finding the allowable stress for steel channels.

Equation F1-6:

IF:

$$\sqrt{\frac{102000}{Fy}} = 53.2290647 \quad < \quad \frac{Lb}{rt} = 93.1034483 \quad < \quad \sqrt{\frac{510000}{Fy}} = 119.0238071$$

$$Fb1 := \left[\frac{2}{3} - \frac{Fy \cdot \left(\frac{Lb}{rt}\right)^2}{1530000}\right] \cdot Fy$$

THEN:

$Fb1 = 16.6574806$ Ksi

Simple Support 2/

Equation F1-7:

IF:

$$\frac{Lb}{rt} = 93.1034483 \quad > \quad \sqrt{\frac{510000}{Fy}} = 119.0238071$$

THEN:

$$Fb2 := \frac{170000}{\left(\frac{Lb}{rt}\right)^2} \qquad Fb2 = 19.611797 \quad \text{Ksi}$$

Equation F1-8: (Also to be used for ALL Channels)

For any value of Lb/rt:

$$Fb3 := \frac{12000}{Lb \cdot z} \qquad Fb3 = 25.5574724 \quad \text{Ksi}$$

Beam Type: **Fixed Support** Don Mitchell 6/28/93

WT 10.5x73.5 **Uniform Load**

$E := 29000000$ $I := 188$ $S := 30.0$ $l := 270$ $x := 0..l$

$w := 30.8$ $bf := 1.15$

$z := 1.739$ (d/Af)

$mid := \frac{l}{2} + 1$

$rt := 2.9$ (let rt = .01 for channels)

$Lb := 270$ (unsupported Length)

Moment Calculation:

$$M_x := \frac{w}{12}\cdot\left(6\cdot l\cdot x - 6\cdot x^2 - l^2\right)$$

Max Moment:

$M_{mid} = 93539.6$

$M_0 = -1.8711\cdot 10^5$

Deflection Calculation:

$$y_x := \frac{-\left(w\cdot x^2\right)}{24\cdot E\cdot I}\cdot(l - x)^2$$

$$ymax := \frac{-\left(w\cdot l^4\right)}{384\cdot E\cdot I}$$

$ymax = -0.07818$

Stress Calculation:

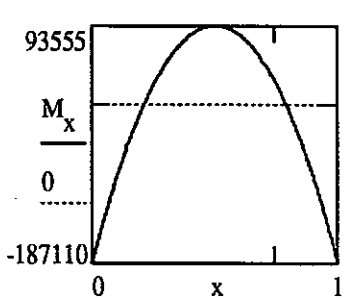
$$\sigma_x := \frac{M_x}{S}$$

Max Stress:

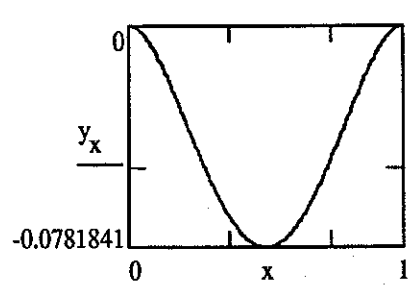
$\sigma_{mid} = 3117.98667$ psi

$\sigma_0 = -6237$

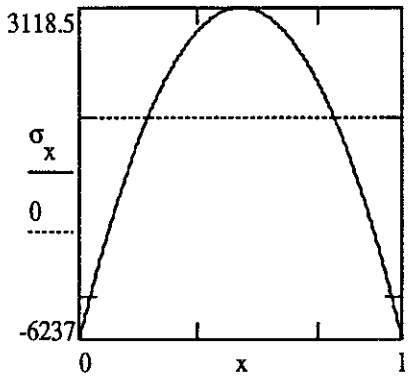
Moments



Deflections



Stress



Calculate the allowable stress for the steel beam

$Fy := 36$ KSI (yield strength of steel) $Fb := .66 \cdot Fy$

Calculate the Lc value (max unsupported length such that Fb = .66 Fy)

$$Lc1 := \frac{76 \cdot bf}{\sqrt{Fy}} \qquad Lc2 := \frac{20000}{z \cdot Fy} \qquad Lc := \begin{pmatrix} Lc1 \\ Lc2 \end{pmatrix} \qquad Lc := \mathrm{sort}(Lc)_{0,0}$$

$Lc1 = 14.56667$ $Lc = 14.56667$

$Lc2 = 319.4684$ $Lb = 270$

If Lb < Lc, then
Fb = .66 Fy

if so, $Fb = 23.76$ Ksi

Three Equations are given to calculate the allowable stress. Given the criterion, the value of Fb can be found. Equation F1-8 will be used when finding the allowable stress for steel channels.

Equation F1-6:

IF:

$$\sqrt{\frac{102000}{Fy}} = 53.22906 \quad < \quad \frac{Lb}{rt} = 93.10345 \quad < \quad \sqrt{\frac{510000}{Fy}} = 119.02381$$

$$Fb1 := \left[\frac{2}{3} - \frac{Fy \cdot \left(\frac{Lb}{rt}\right)^2}{1530000}\right] \cdot Fy$$

THEN: $Fb1 = 16.65748$ Ksi

Fixed Support 2/3

Equation F1-7:

IF:

$$\frac{Lb}{rt} = 93.10345 \quad > \quad \sqrt{\frac{510000}{Fy}} = 119.02381$$

THEN:

$$Fb2 := \frac{170000}{\left(\frac{Lb}{rt}\right)^2} \qquad Fb2 = 19.6118 \quad \text{Ksi}$$

Equation F1-8: (Also to be used for ALL Channels)

For any value of Lb/rt:

$$Fb3 := \frac{12000}{Lb \cdot z} \qquad Fb3 = 25.55747 \quad \text{Ksi}$$

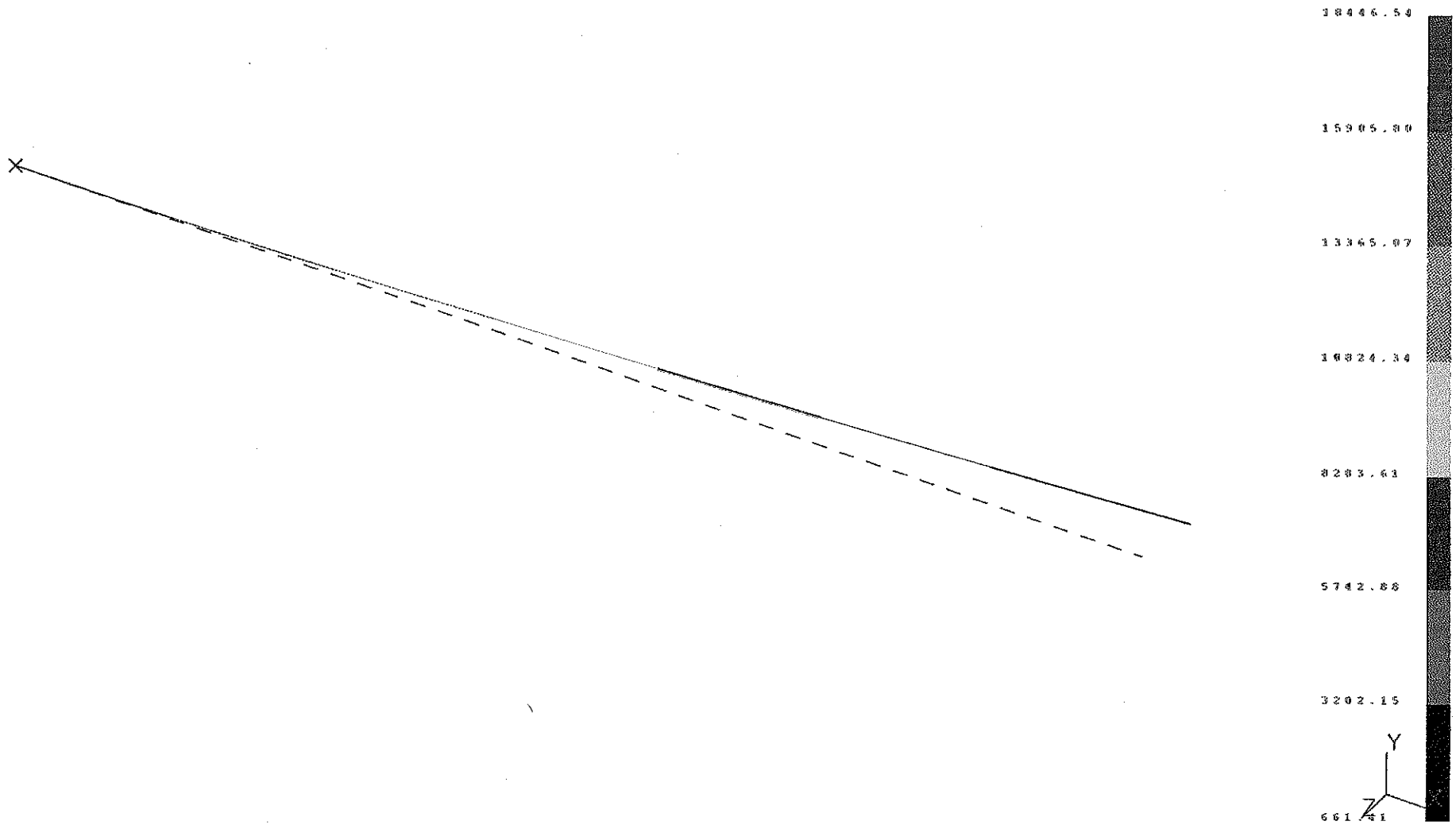
SDRC I-DEAS VI.i(s): FE_Modeling_&_Analysis 25-JUN-93 10:41:28

Database: cdf_support_arm_muon_wall
View : No stored View
Task: Post Processing
Model: 2-FE MODEL2

Units : IN
Display : No stored Option
Model Bin: 1-MAIN
Associated Workset: 2-WORKING_SET2

cdf_support_arm_muon_wall

LOAD SET: 1 - LOAD SET 1
FRAME OF REF: GLOBAL
STRESS - VON MISES MIN: 661.41 MAX: 18446.54



SDRC I-DEAS VI: FE_Modeling_&_Analysis

Database: odf_beam

View: Stored View

Task: Mesh Creation

Model: 5-UNISTRUT BEAM

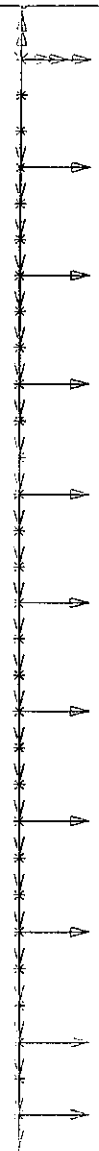
11-AUG-91 14:58:31

Units : IN

Model Dim: [illegible]

Associated Workset: [illegible]

A3300 Unistrut



63#, 74.8 in-# at 12" increments

X Directional supports every 3'

SDRC I-DEAS VI: FE_Modeling_&_Analysis 26-AUG-92 13:46:59
cdf_beam
Displacements for A3300 Unistrut

Group ID : No stored PERMANENT GROUP
Analysis Dataset : 13 - CASE 4,LOAD 3,DISPLACEMENTS
Report Type : Contour Units : IN
Dataset Type : Displacements Load Set : 3
Frame of Reference: Global Data Component: Y-Component

Node	Displ-X	Displ-Y	Displ-Z	Rot-X	Rot-Y	Rot-Z
1	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
2	-1.411E-03	-3.292E-03	0.000E+00	0.000E+00	0.000E+00	2.124E-04
3	-9.565E-04	-6.471E-03	0.000E+00	0.000E+00	0.000E+00	3.110E-04
4	0.000E+00	-9.537E-03	0.000E+00	0.000E+00	0.000E+00	2.960E-04
5	3.767E-04	-1.249E-02	0.000E+00	0.000E+00	0.000E+00	2.393E-04
6	2.553E-04	-1.533E-02	0.000E+00	0.000E+00	0.000E+00	2.129E-04
7	0.000E+00	-1.805E-02	0.000E+00	0.000E+00	0.000E+00	2.170E-04
8	-1.002E-04	-2.066E-02	0.000E+00	0.000E+00	0.000E+00	2.321E-04
9	-6.764E-05	-2.316E-02	0.000E+00	0.000E+00	0.000E+00	2.391E-04
10	0.000E+00	-2.554E-02	0.000E+00	0.000E+00	0.000E+00	2.380E-04
11	2.546E-05	-2.782E-02	0.000E+00	0.000E+00	0.000E+00	2.339E-04
12	1.613E-05	-2.997E-02	0.000E+00	0.000E+00	0.000E+00	2.322E-04
13	0.000E+00	-3.202E-02	0.000E+00	0.000E+00	0.000E+00	2.328E-04
14	-1.900E-06	-3.395E-02	0.000E+00	0.000E+00	0.000E+00	2.339E-04
15	2.923E-06	-3.576E-02	0.000E+00	0.000E+00	0.000E+00	2.339E-04
16	0.000E+00	-3.747E-02	0.000E+00	0.000E+00	0.000E+00	2.326E-04
17	-1.784E-05	-3.905E-02	0.000E+00	0.000E+00	0.000E+00	2.320E-04
18	-2.785E-05	-4.053E-02	0.000E+00	0.000E+00	0.000E+00	2.339E-04
19	0.000E+00	-4.189E-02	0.000E+00	0.000E+00	0.000E+00	2.383E-04
20	7.348E-05	-4.314E-02	0.000E+00	0.000E+00	0.000E+00	2.396E-04
21	1.088E-04	-4.428E-02	0.000E+00	0.000E+00	0.000E+00	2.320E-04
22	0.000E+00	-4.530E-02	0.000E+00	0.000E+00	0.000E+00	2.156E-04
23	-2.770E-04	-4.621E-02	0.000E+00	0.000E+00	0.000E+00	2.112E-04
24	-4.088E-04	-4.700E-02	0.000E+00	0.000E+00	0.000E+00	2.398E-04
25	0.000E+00	-4.768E-02	0.000E+00	0.000E+00	0.000E+00	3.013E-04
26	1.038E-03	-4.825E-02	0.000E+00	0.000E+00	0.000E+00	3.176E-04
27	1.531E-03	-4.870E-02	0.000E+00	0.000E+00	0.000E+00	2.105E-04
28	0.000E+00	-4.905E-02	0.000E+00	0.000E+00	0.000E+00	-1.985E-05
29	-3.180E-03	-4.927E-02	0.000E+00	0.000E+00	0.000E+00	9.910E-05
30	0.000E+00	-4.939E-02	0.000E+00	0.000E+00	0.000E+00	1.040E-03
	27	1	1	1	1	30
Maximum	1.531E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.040E-03
	29	30	1	1	1	28
Minimum	-3.180E-03	-4.939E-02	0.000E+00	0.000E+00	0.000E+00	-1.985E-05
Average	-1.007E-04	-3.238E-02	0.000E+00	0.000E+00	0.000E+00	2.463E-04

1

SDRC I-DEAS VI: FE_Modeling_&_Analysis 26-AUG-92 13:49:56
cdf_beam
Von Mises Stress for A3300 Unistrut

Group ID : No stored PERMANENT GROUP
Analysis Dataset : 15 - CASE 4,LOAD 3,STRESSES
Report Type : Contour Units : IN
Dataset Type : Stress Load Set : 3
Frame of Reference: Global Data Component: Von Mises

Node	Max Prin	Mid Prin	Min Prin	Max Shear	Von Mises
1	8.230E+03	8.609E+02	-1.028E+00	4.116E+03	7.836E+03
2	8.088E+03	-1.046E+00	-1.236E+02	4.106E+03	8.151E+03
3	7.805E+03	-1.084E+00	-3.324E+01	3.919E+03	7.822E+03
4	7.521E+03	5.715E+01	-1.188E+00	3.761E+03	7.493E+03
5	7.237E+03	3.300E+01	-1.303E+00	3.619E+03	7.222E+03
6	6.954E+03	8.863E+00	-1.356E+00	3.478E+03	6.950E+03
7	6.670E+03	-1.394E+00	-1.528E+01	3.343E+03	6.678E+03
8	6.386E+03	-1.435E+00	-8.800E+00	3.198E+03	6.391E+03
9	6.103E+03	-1.502E+00	-2.321E+00	3.052E+03	6.104E+03
10	5.819E+03	4.158E+00	-1.581E+00	2.910E+03	5.818E+03
11	5.535E+03	2.304E+00	-1.669E+00	2.768E+03	5.535E+03
12	5.251E+03	4.508E-01	-1.759E+00	2.627E+03	5.252E+03
13	4.968E+03	-1.403E+00	-1.857E+00	2.485E+03	4.969E+03
14	4.684E+03	-4.455E-01	-1.967E+00	2.343E+03	4.685E+03
15	4.401E+03	5.133E-01	-2.093E+00	2.201E+03	4.401E+03
16	4.117E+03	1.470E+00	-2.241E+00	2.060E+03	4.117E+03
17	3.833E+03	-5.189E-01	-2.410E+00	1.918E+03	3.835E+03
18	3.550E+03	-2.508E+00	-2.602E+00	1.776E+03	3.552E+03
19	3.266E+03	-2.816E+00	-4.497E+00	1.635E+03	3.270E+03
20	2.983E+03	2.527E+00	-3.071E+00	1.493E+03	2.983E+03
21	2.699E+03	9.550E+00	-3.394E+00	1.351E+03	2.696E+03
22	2.416E+03	1.657E+01	-3.851E+00	1.210E+03	2.410E+03
23	2.133E+03	-4.429E+00	-9.618E+00	1.071E+03	2.140E+03
24	1.850E+03	-5.107E+00	-3.581E+01	9.427E+02	1.870E+03
25	1.566E+03	-5.691E+00	-6.200E+01	8.142E+02	1.601E+03
26	1.284E+03	3.606E+01	-6.543E+00	6.450E+02	1.269E+03
27	1.002E+03	1.341E+02	-8.385E+00	5.050E+02	9.468E+02
28	7.256E+02	2.322E+02	-1.620E+01	3.709E+02	6.540E+02
29	4.598E+02	-3.410E+01	-4.213E+02	4.405E+02	7.649E+02
30	3.311E+02	-4.735E+01	-2.150E+03	1.240E+03	2.315E+03
	1	1	1	1	2
Maximum	8.230E+03	8.609E+02	-1.028E+00	4.116E+03	8.151E+03 psi
	30	30	30	28	28
Minimum	3.311E+02	-4.735E+01	-2.150E+03	3.709E+02	6.540E+02
Average	4.262E+03	4.297E+01	-9.769E+01	2.180E+03	4.324E+03

SDRC I-DEAS VI: FE_Modeling_&_Analysis 26-AUG-92 13:51:59
cdf_beam
Reaction Forces for A3300 Unistrut

Group ID : No stored PERMANENT GROUP
Analysis Dataset : 14 - CASE 4,LOAD 3,REACTION FORCES
Report Type : Contour Units : IN
Dataset Type : Reaction Forces Load Set : 3
Frame of Reference: Global Data Component: Y-Component

Node	Force-X	Force-Y	Force-Z	Rot-X	Rot-Y	Rot-Z
1	5.971E+00	1.827E+03	0.000E+00	0.000E+00	0.000E+00	2.995E+01
2	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
3	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
4	3.321E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
5	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
6	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
7	-8.879E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
8	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
9	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
10	2.416E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
13	-8.149E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
16	8.543E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
19	-2.613E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
22	9.631E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
25	-3.603E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
28	2.179E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
30	-8.128E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Total	0.000E+00	1.827E+03	0.000E+00	0.000E+00	0.000E+00	2.995E+01
	1	1	1	1	1	1
Maximum	5.971E+00	1.827E+03	0.000E+00	0.000E+00	0.000E+00	2.995E+01
	30	2	1	1	1	2
Minimum	-8.128E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Average	0.000E+00	6.090E+01	0.000E+00	0.000E+00	0.000E+00	9.985E-01