

“INNOVATIVE SOLUTIONS TO SERVE YOU BEST!”



GENMARK Engineering & Management

- **10010 – 164 Street, Edmonton, AB**
- **T5P 4Y3 CANADA**
- **Phone: (780) 461 - 9234**
- **Fax : (780) 461 - 9624**

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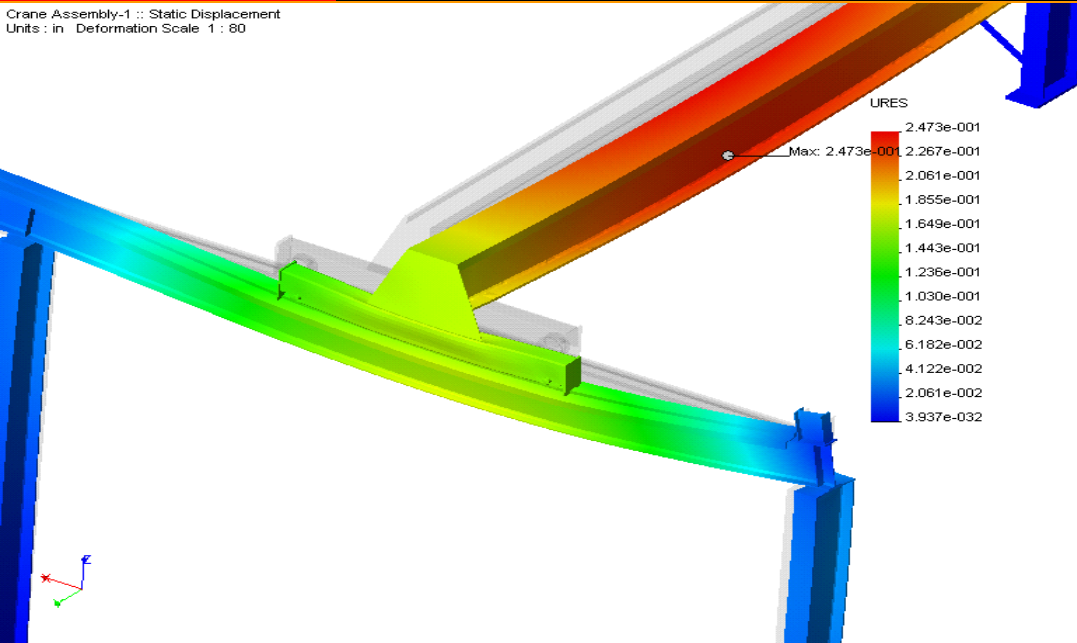
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- **Contract engineering and management services**
- **Design concepts to project reality**
- **Long-time client relationship**
- **Quality service under demanding project timelines**
- **Complete solution for modifications to existing equipment**
- **Design and drafting at competitive prices**

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Crane Assembly-1 :: Static Displacement
Units : in Deformation Scale 1 : 80



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Engineering design

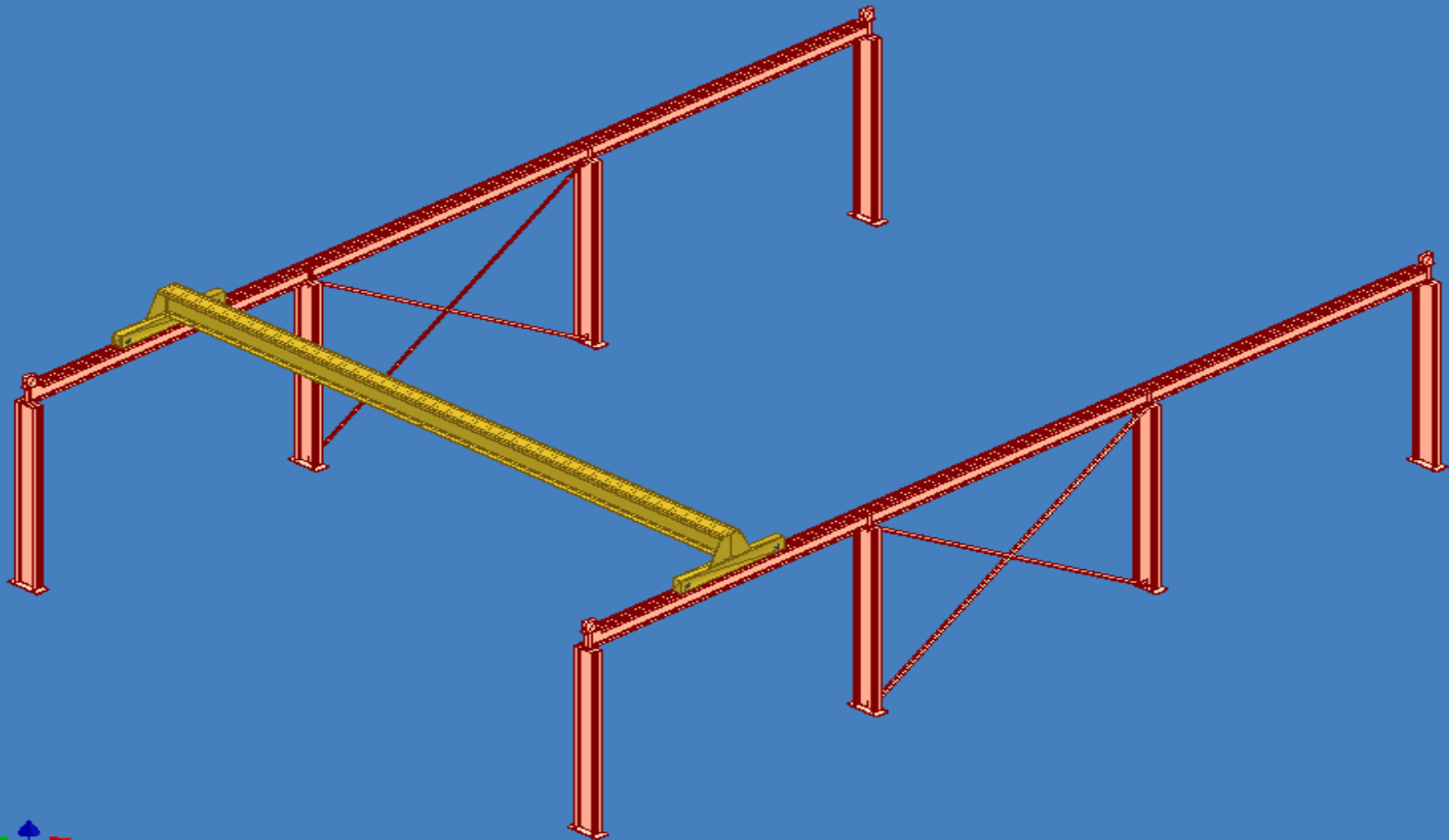
- **Tight timescales, high quality and accuracy**
- **Latest technology adds value and brings projects to a successful conclusions**
- **Various services from detailed drafting to customer specifications, to technically challenging projects**
- **Solid modeling, 2D to 3D conversion, design and structural calculations, FEA, AutoDesk Inventor, SolidWorks**
- **The future of engineering design is through the development of 3D modelling**

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3D MODEL OF 10 TON CRANE SYSTEM, 40 FT SPAN, 20 FT COLUMN SPACING, 15 FT COLUMN HEIGHT

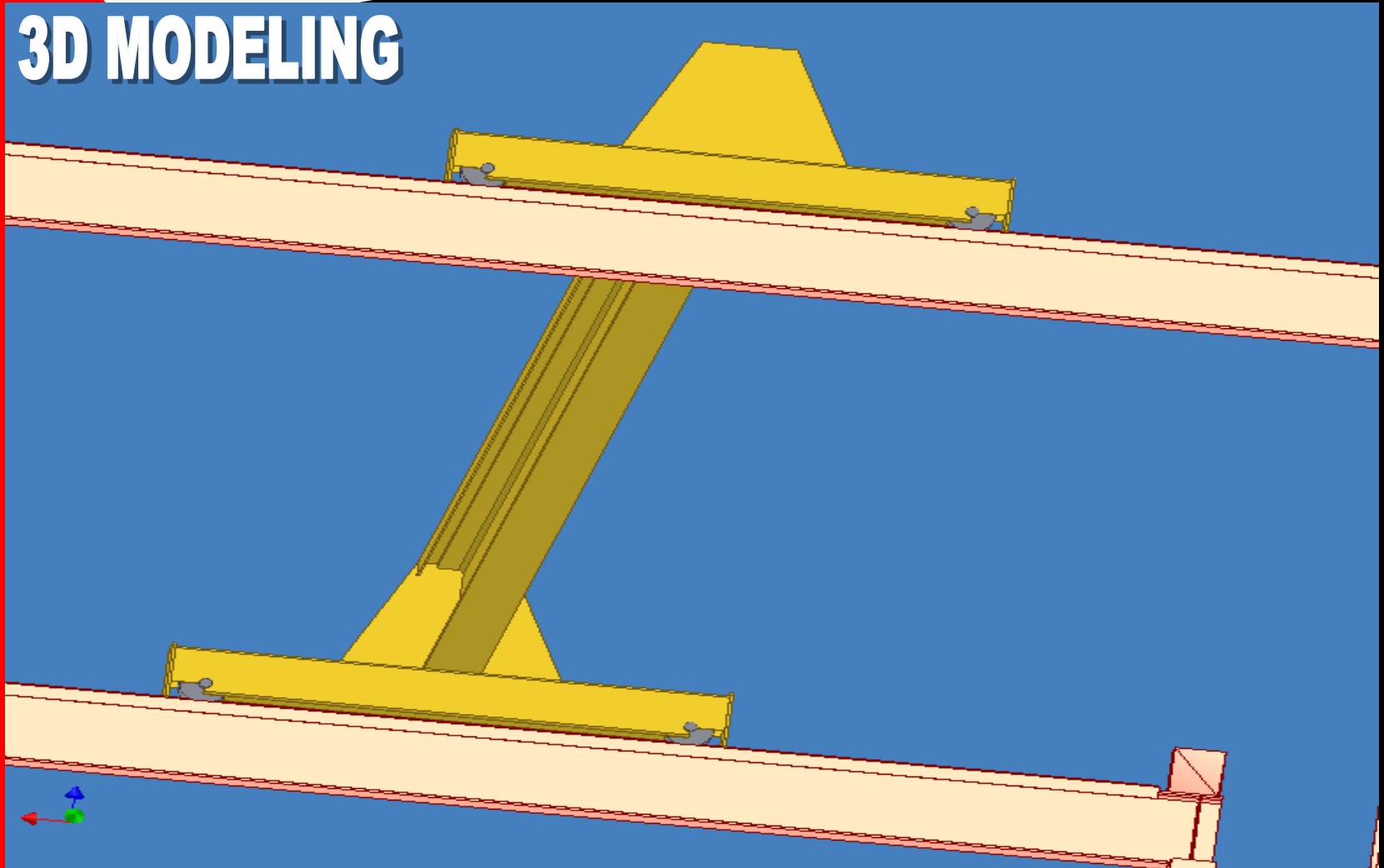


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3D MODELING



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TOP RUNNING SINGLE GIRDER CRANE	
CUSTOMER NAME	
PO #	
DATE	30/11/2004

Design output

Capacity	10.00	Tons	20.00	Kips	Impact Factor	0.25	
Hoist Weight			2.04	Kips	Deflection Ratio	600.00	
Bridge Span			40.00	Ft	Lateral Factor	0.10	
Weight of one End Truck			0.50	Kips	Minimum Hook Approach	2.00	Ft
No. of Wheels per End Truck			2		Festoon weight	20.00	Lb/Ft
Steel Yield Strength			44.00	Ksi	Walkway	0.00	Lb/Ft
No. of Wheels per Trolley			4		Effective Span Ratio	1.00	
Estimated Girder Weight			147.90	Lb/Ft	Load Factor	0.95	
Simple Static Moment			220.40	Kip.Ft.	Maximum Static Moment	249.98	Kip.Ft.
Simple Impact Moment			270.40	Kip.Ft.	Maximum Impact Moment	299.98	Kip.Ft.
Simple Dead Load Moment			29.58	Kip.Ft.	Maximum Lateral Moment	25.00	Kip.Ft.

REQUIRED MOMENTS OF INERTIA

I_y (required)	2188.95	in ⁴	I_x (required)	218.90	in ⁴
------------------	---------	-----------------	------------------	--------	-----------------

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SECTION PROPERTIES OF BEAM AND CHANNEL						COMBINED PROPERTIES		
BEAM	W24x94		CHANNEL	C15x33.9		y_b	15.268	in
b	9.060	in	b	3.400	in	y_t	9.442	in
d	24.310	in	d	15.000	in	I_u	3722.655	in ⁴
t	0.875	in	t	0.650	in	$I_h (tee)$	369.226	in ⁴
w	0.515	in	w	0.400	in	A_{sec}	37.670	in ²
A	27.700	in ²	A	9.970	in ²	A_T	19.984	in ²
I_{xx}	2700.000	in ⁴	I_{xx}	315.000	in ⁴	S_{xb}	243.816	in ³
I_{yy}	109.000	in ⁴	I_{yy}	8.240	in ⁴	S_{xt}	394.277	in ³
d/b	2.683		x_o	0.792	in	S_{yt}	49.230	in ³
Weight	94.0	Lb/Ft	Weight	33.9	Lb/Ft	r_y	5.621	in
						r_T	4.298	in

DESIGN STRESS								
σ_3	20.432	Ksi	σ_2	8.153	Ksi	σ_1	21.999	Ksi

VERTICAL IMPACT						
σ_{xt}	9.130	Ksi	$\sigma_{xt} (permissible)$	21.999	Ksi	OK
σ_{xb}	14.764	Ksi	$\sigma_{xb} (permissible)$	26.400	Ksi	OK

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MOMENT OF INERTIA

I_y (required)	2188.95	in ⁴	I_y (provided)	3722.65	in ⁴	OK
I_h (required)	218.90	in ⁴	I_h (provided)	369.23	in ⁴	OK
Deflection (actual)	0.470	in	Deflection (permissible)	0.800	in	OK

WIDE FLANGE BEAM - FLANGE BENDING

S	18.481	Ksi				
σ_{xb}	12.303	Ksi				
V	15.392	Ksi	V (permissible)	17.600	Ksi	OK

STANDARD BEAM - FLANGE BENDING

d (eff.)	1.231	in				
S	9.337	Ksi				
σ_{xb}	12.303	Ksi				
V	10.820	Ksi	V (permissible)	17.600	Ksi	OK

Girder Weight	5244	Lb
Festoon and Walkway Weight	820	Lb
End Truck Total Weight	1000	Lb
Total Bridge Weight	7064	Lb

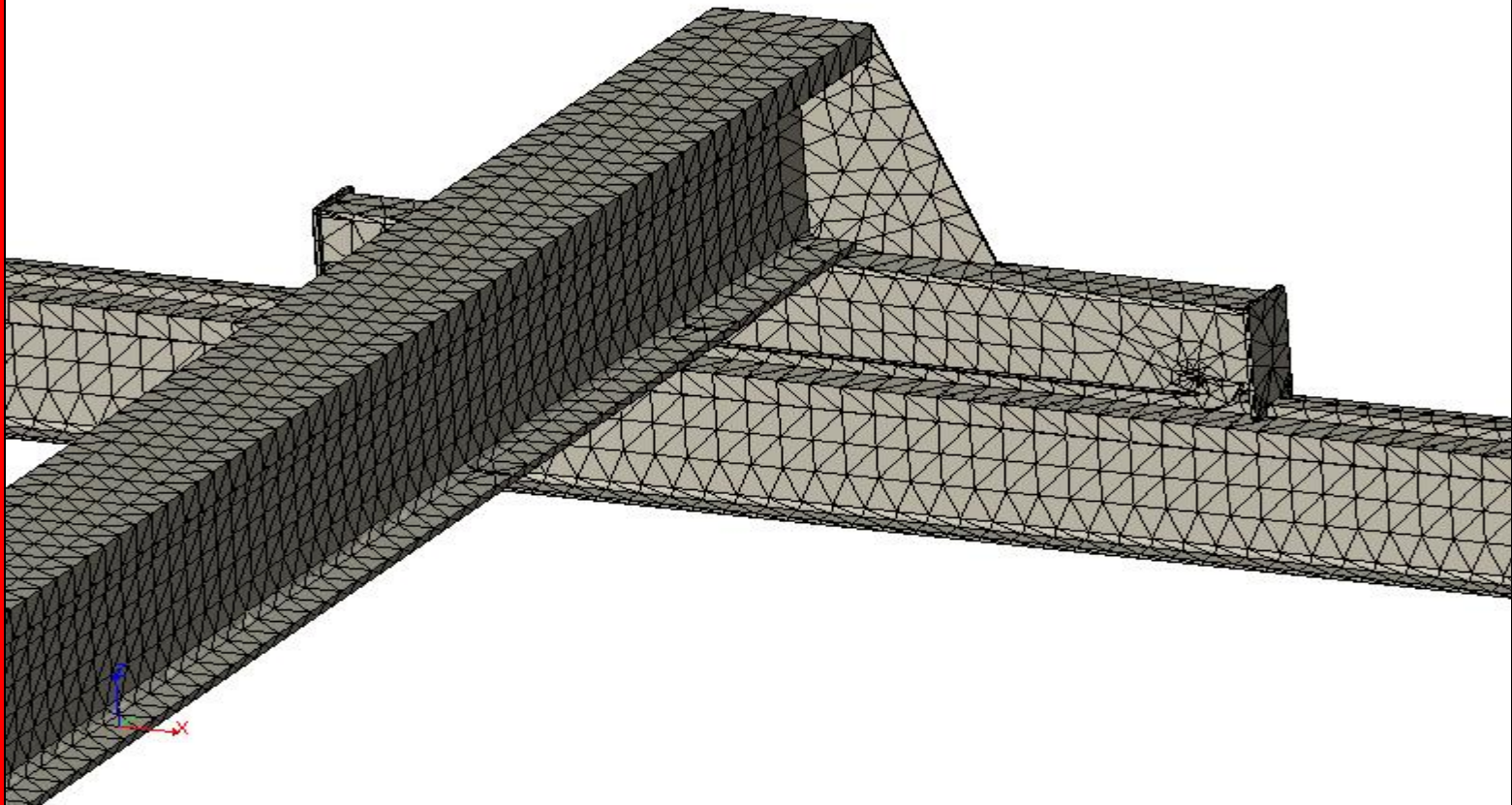
Static Wheel Load	12235	Lb
Impact Wheel Load	14610	Lb
Lateral Wheel Load	1102	Lb

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PREPARATION FOR FINITE ELEMENT ANALYSIS (FEA) - MESHING

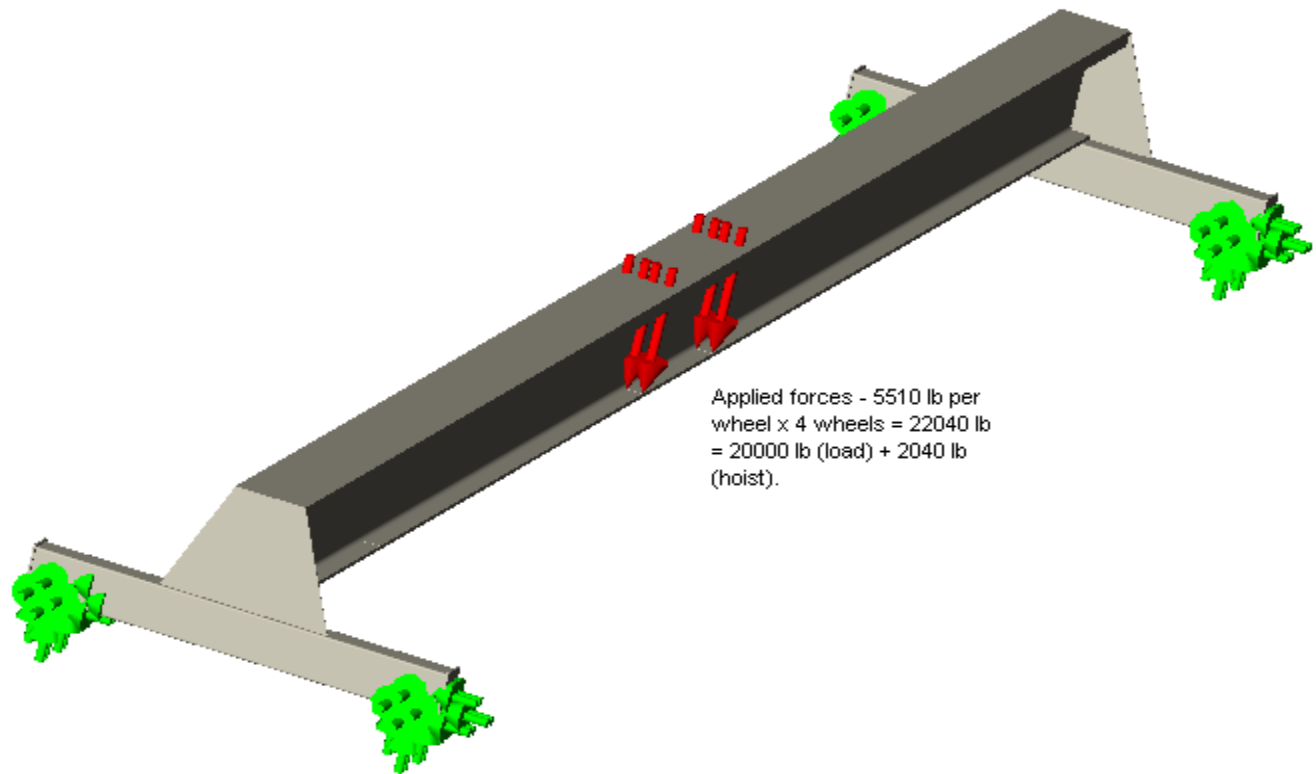


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GENERAL ARRANGEMENT CRANE TEST



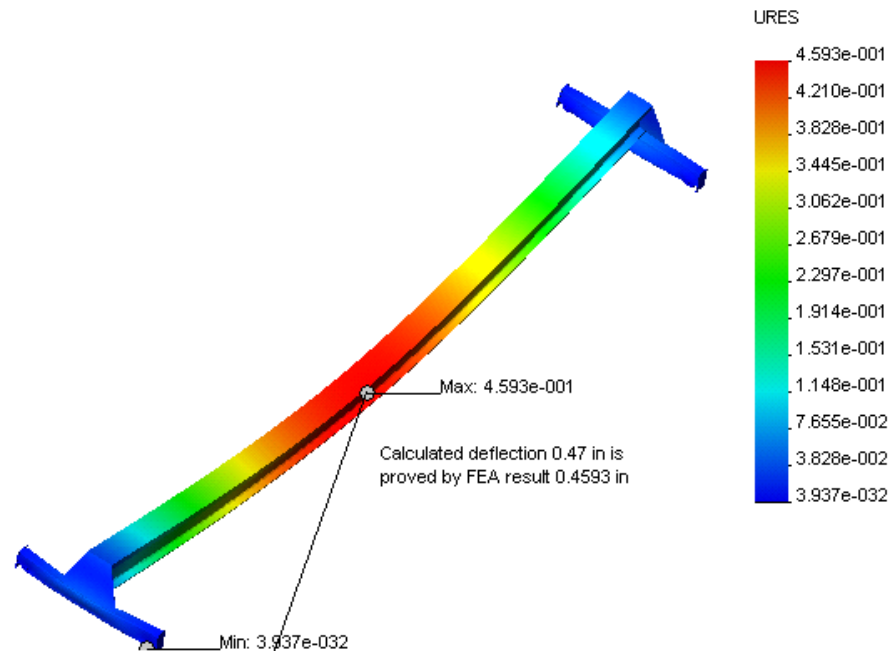
Applied forces - 5510 lb per
wheel x 4 wheels = 22040 lb
= 20000 lb (load) + 2040 lb
(hoist).

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crane-1 :: Static Displacement
Units : in Deformation Scale 1 : 80



MOMENT OF INERTIA

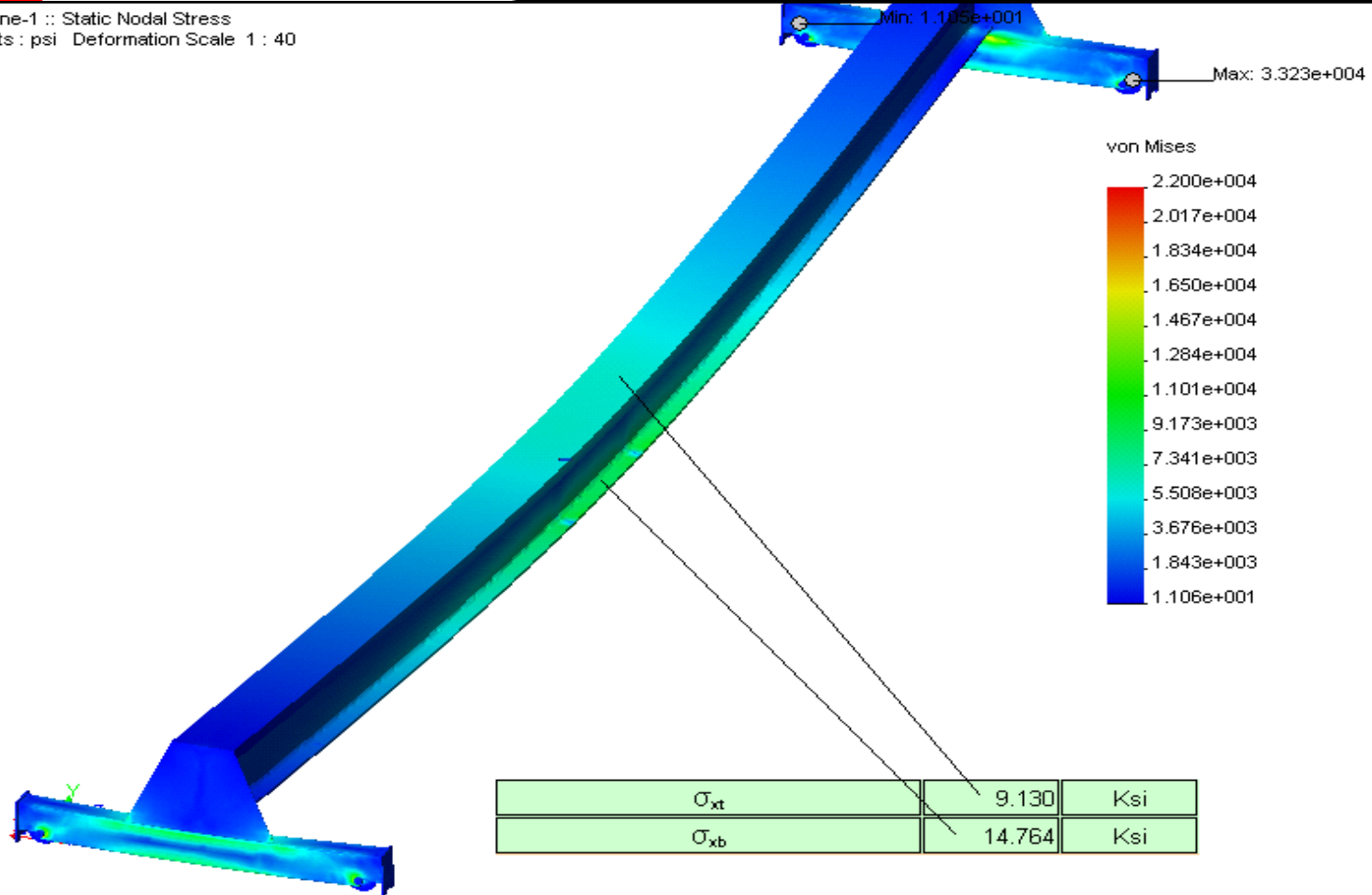
I_v (required)	2188.95	in^4	I_v (provided)	3722.65	in^4	OK
I_h (required)	218.90	in^4	I_h (provided)	369.23	in^4	OK
Deflection (actual)	0.470	in	Deflection (permissible)	0.800	in	OK

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crane-1 :: Static Nodal Stress
Units : psi Deformation Scale 1 : 40

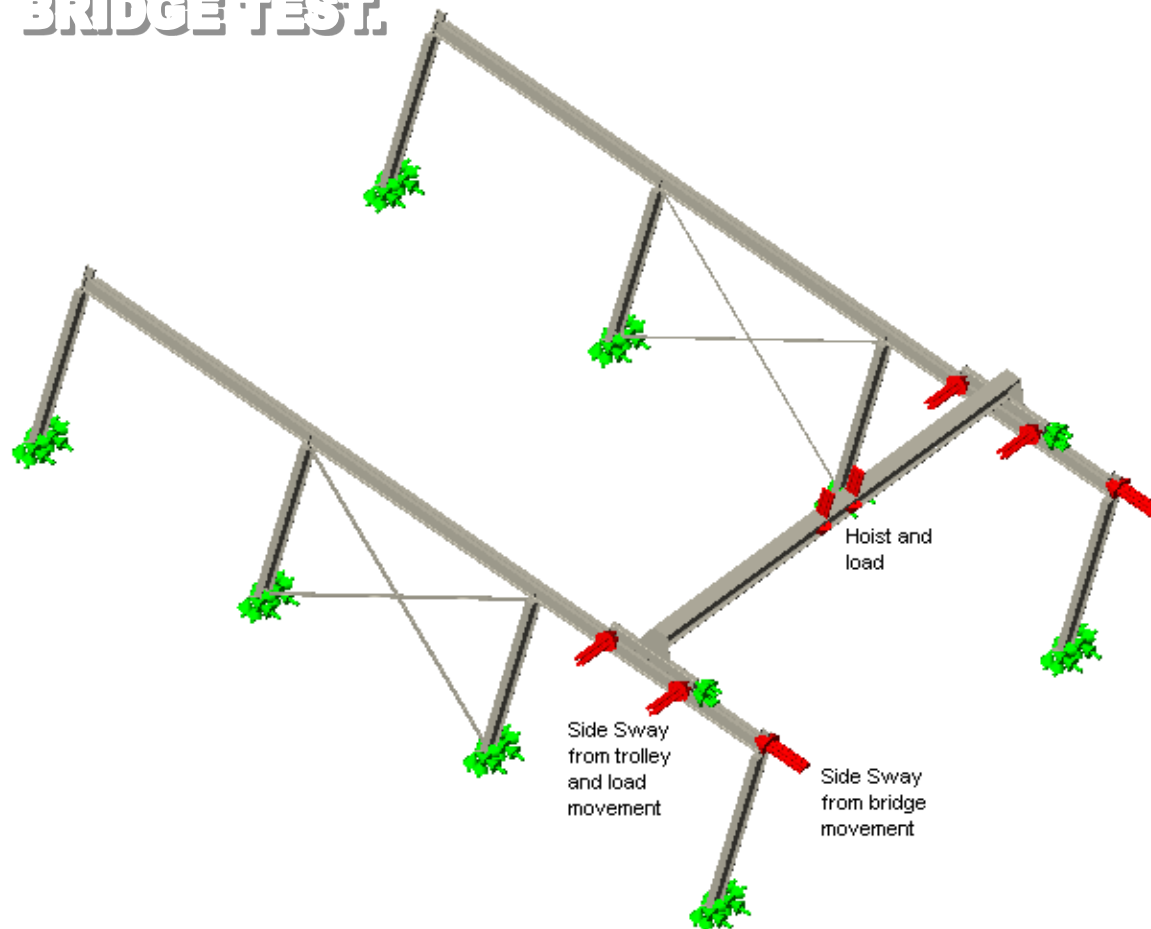


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GENERAL ARRANGEMENT BRIDGE TEST

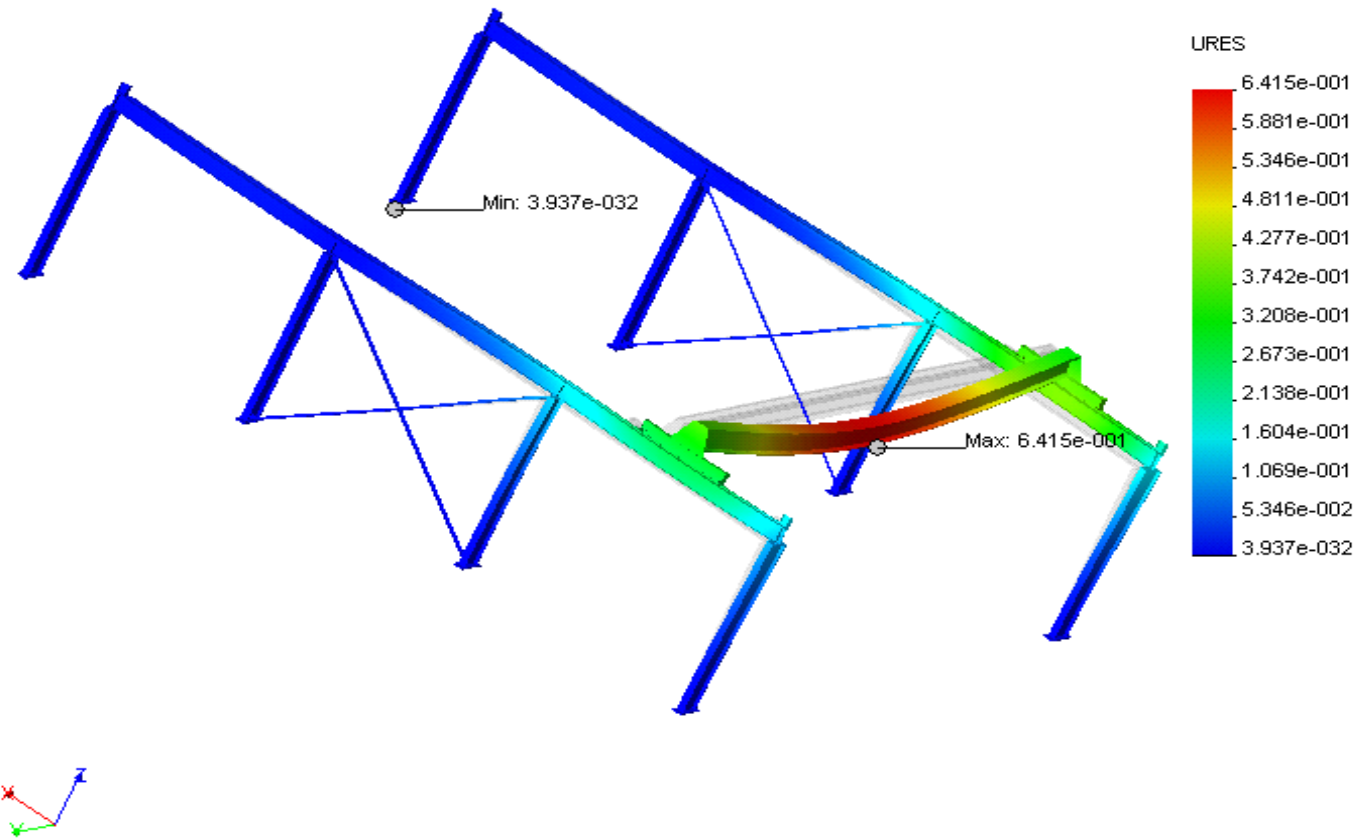


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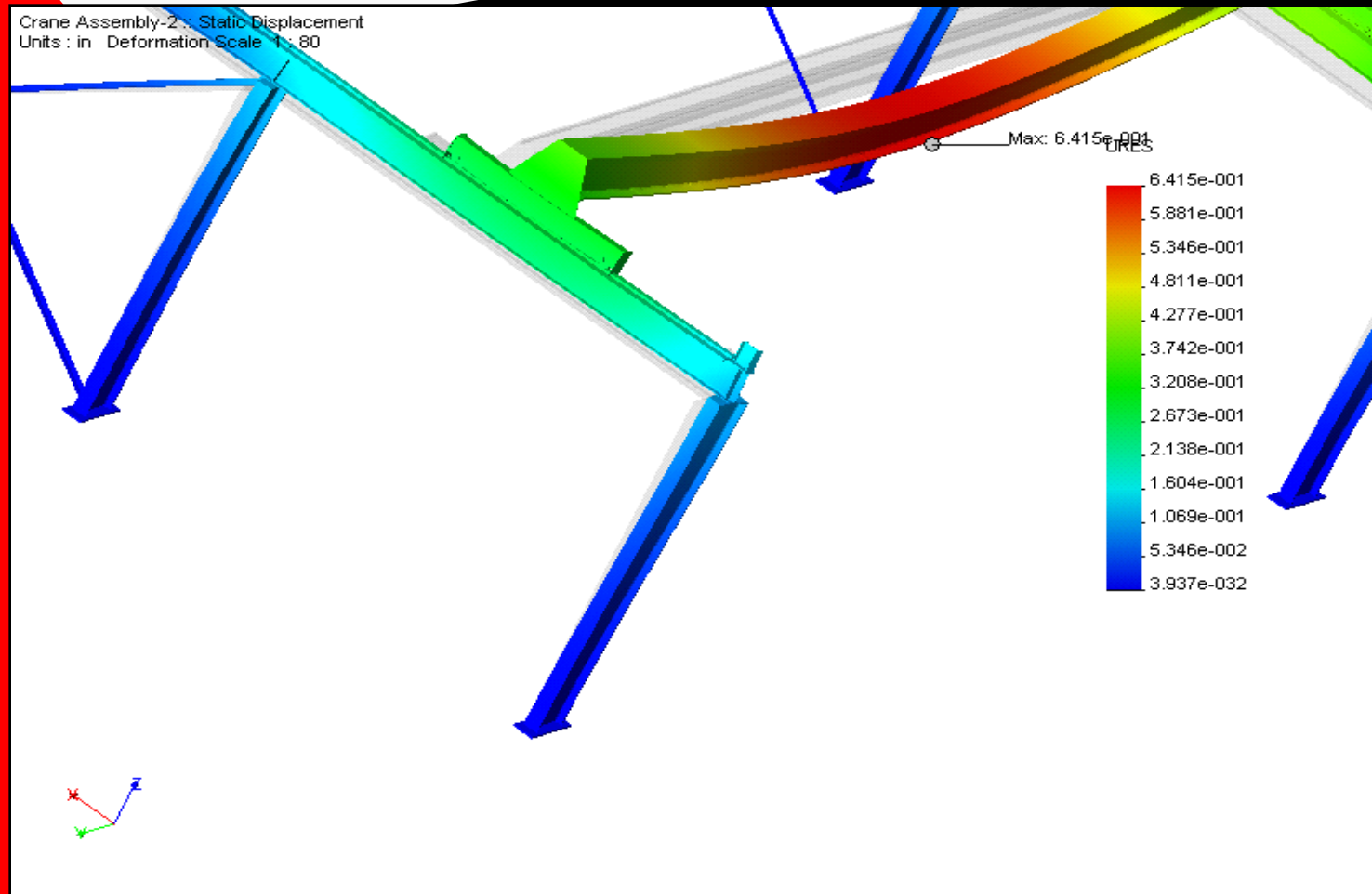


Crane Assembly-2 :: Static Displacement
Units : in Deformation Scale 1 : 80



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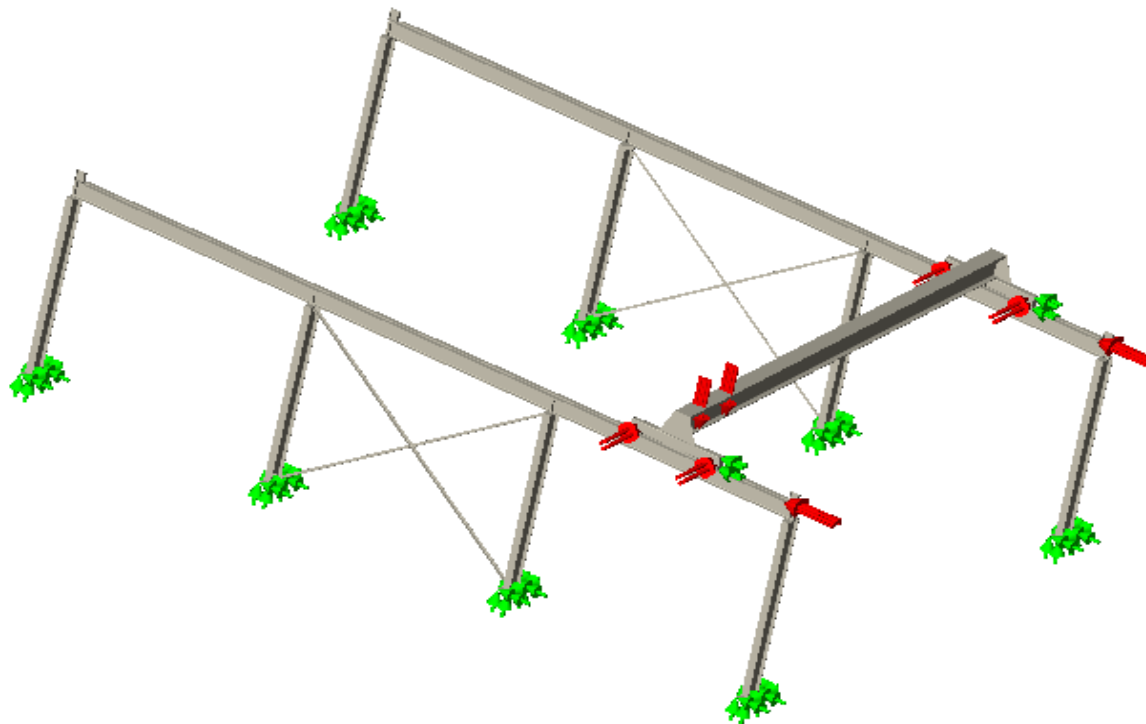


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GENERAL ARRANGEMENT RUNWAYS TEST

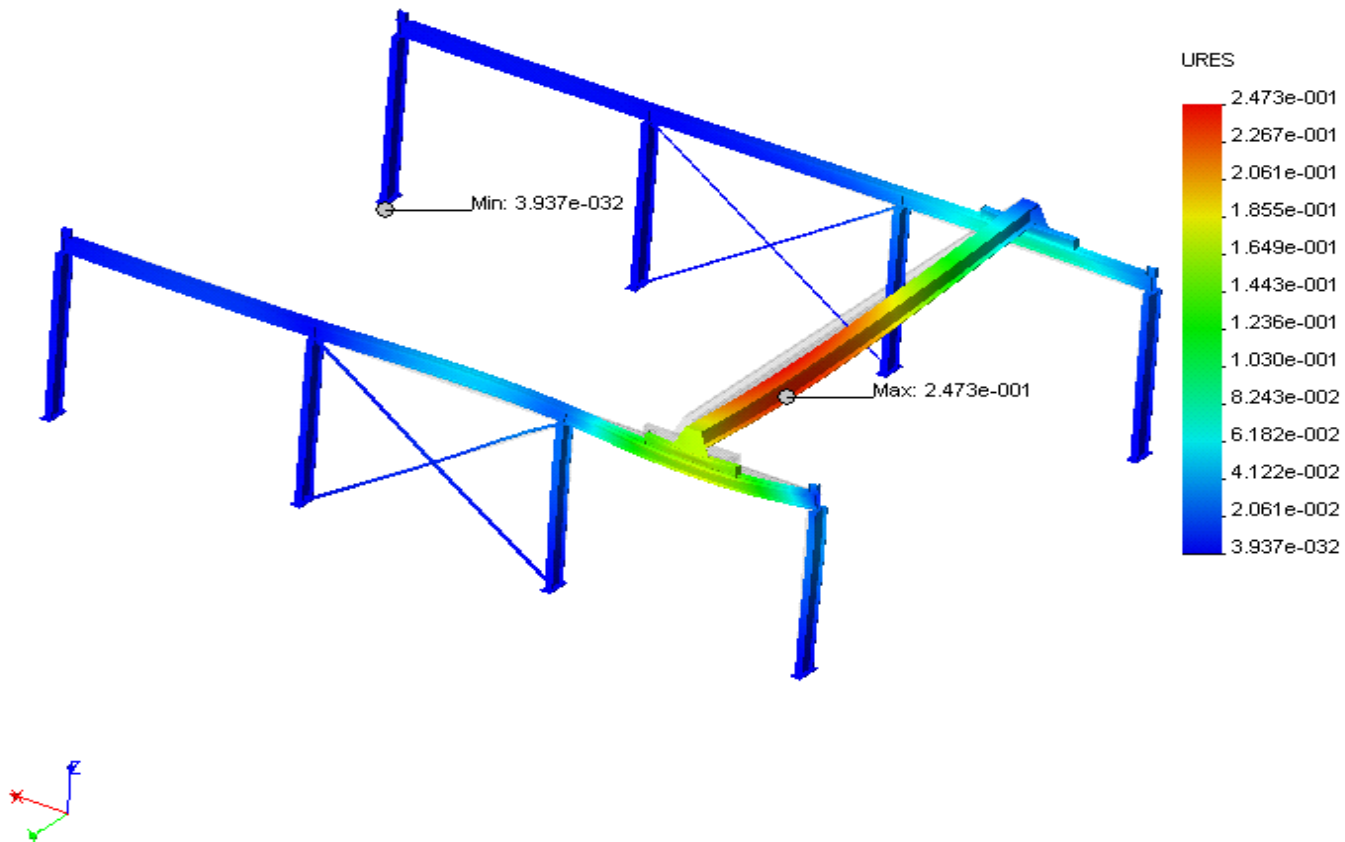


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Crane Assembly-1 :: Static Displacement
Units : in Deformation Scale 1 : 80

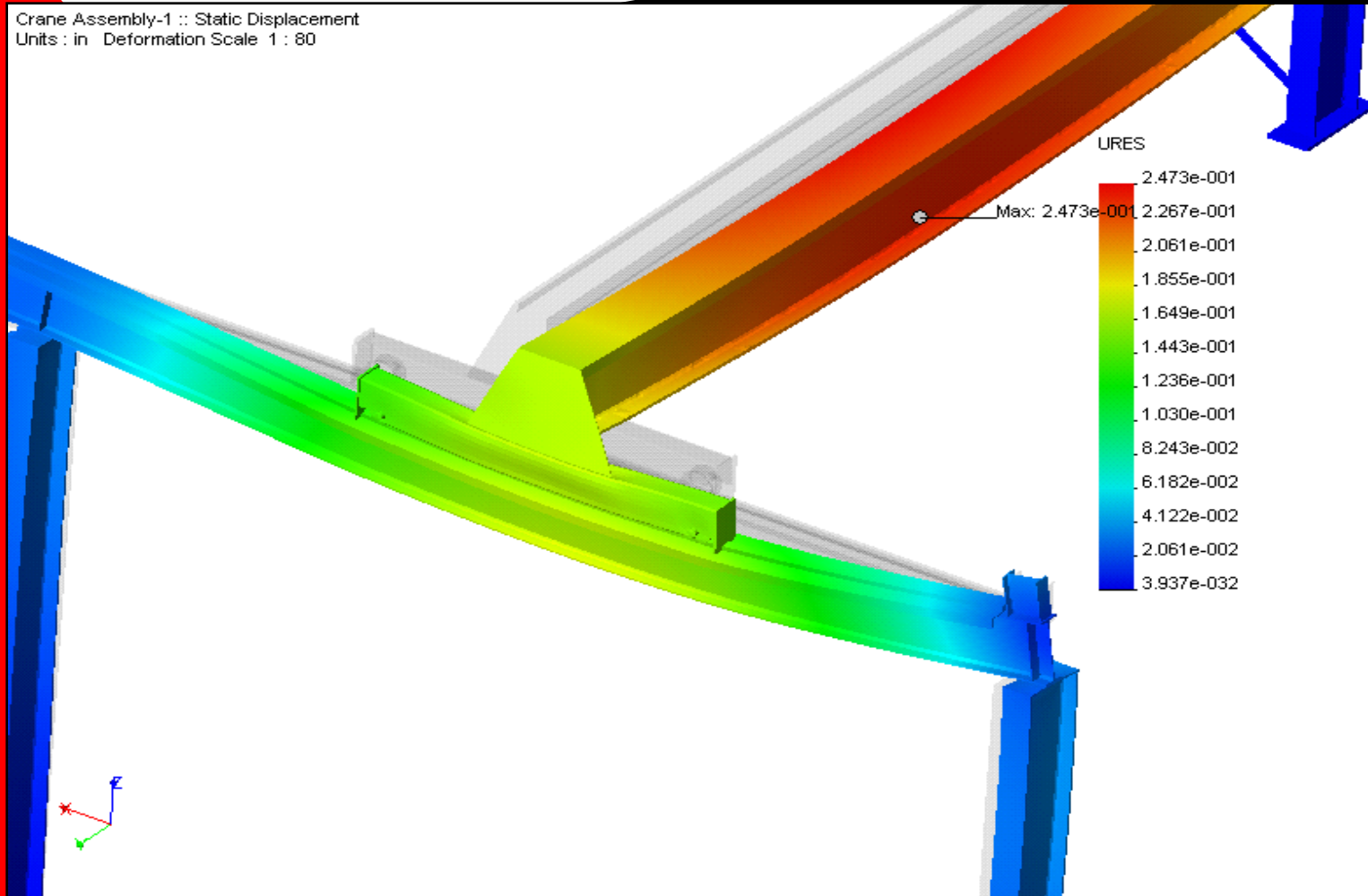


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Crane Assembly-1 :: Static Displacement
Units : in Deformation Scale 1 : 80

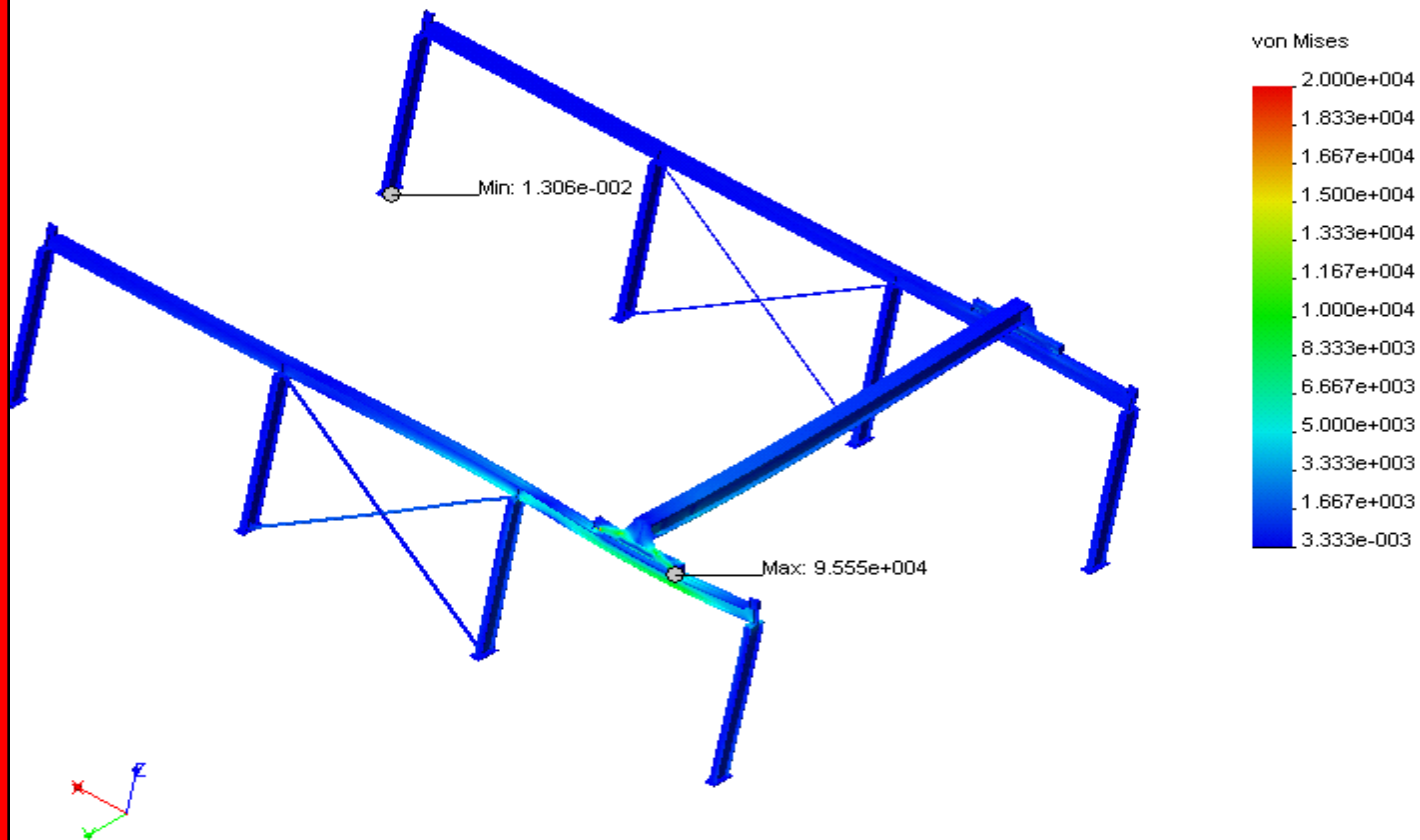


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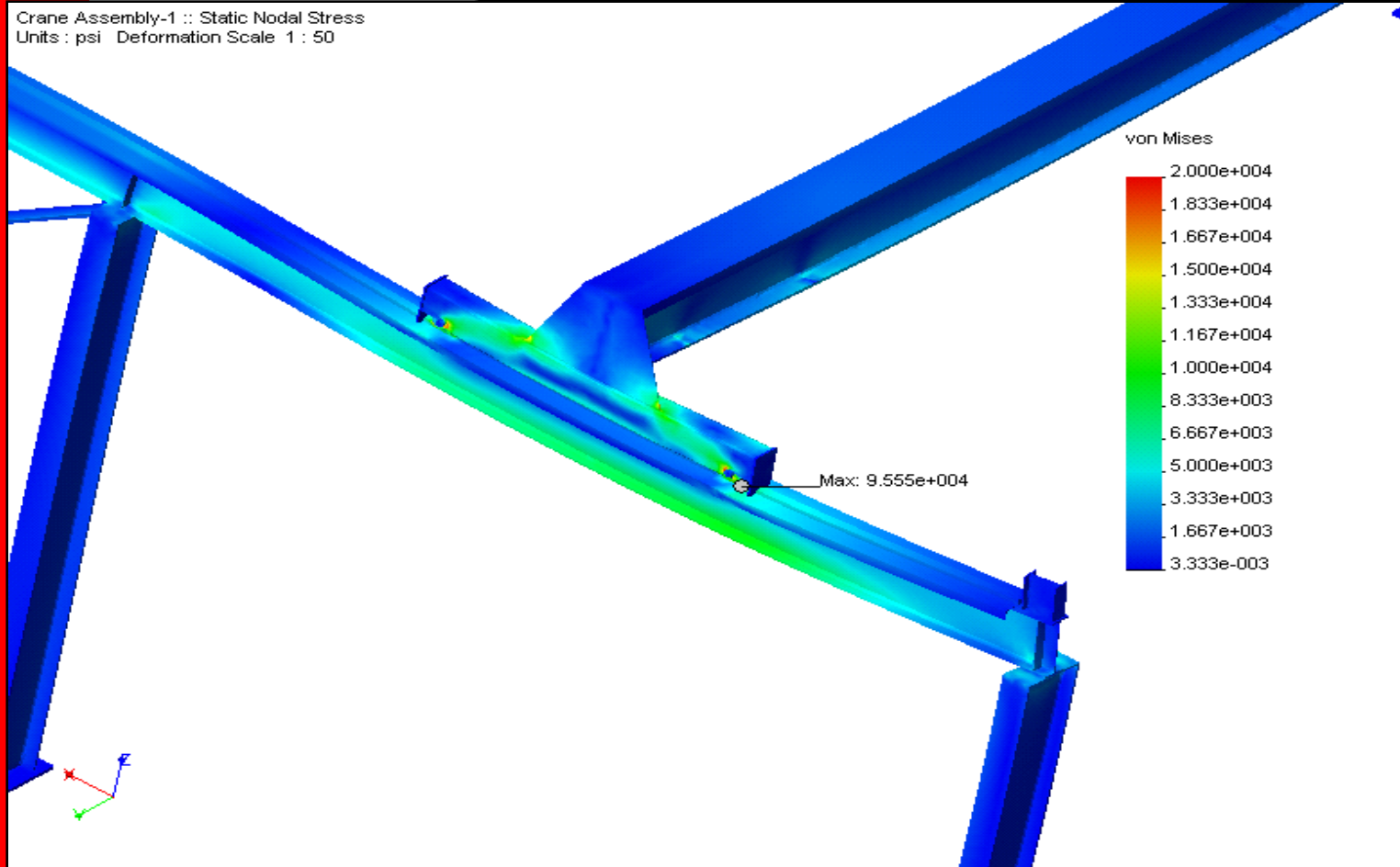


Crane Assembly-1 :: Static Nodal Stress
Units : psi Deformation Scale 1 : 50



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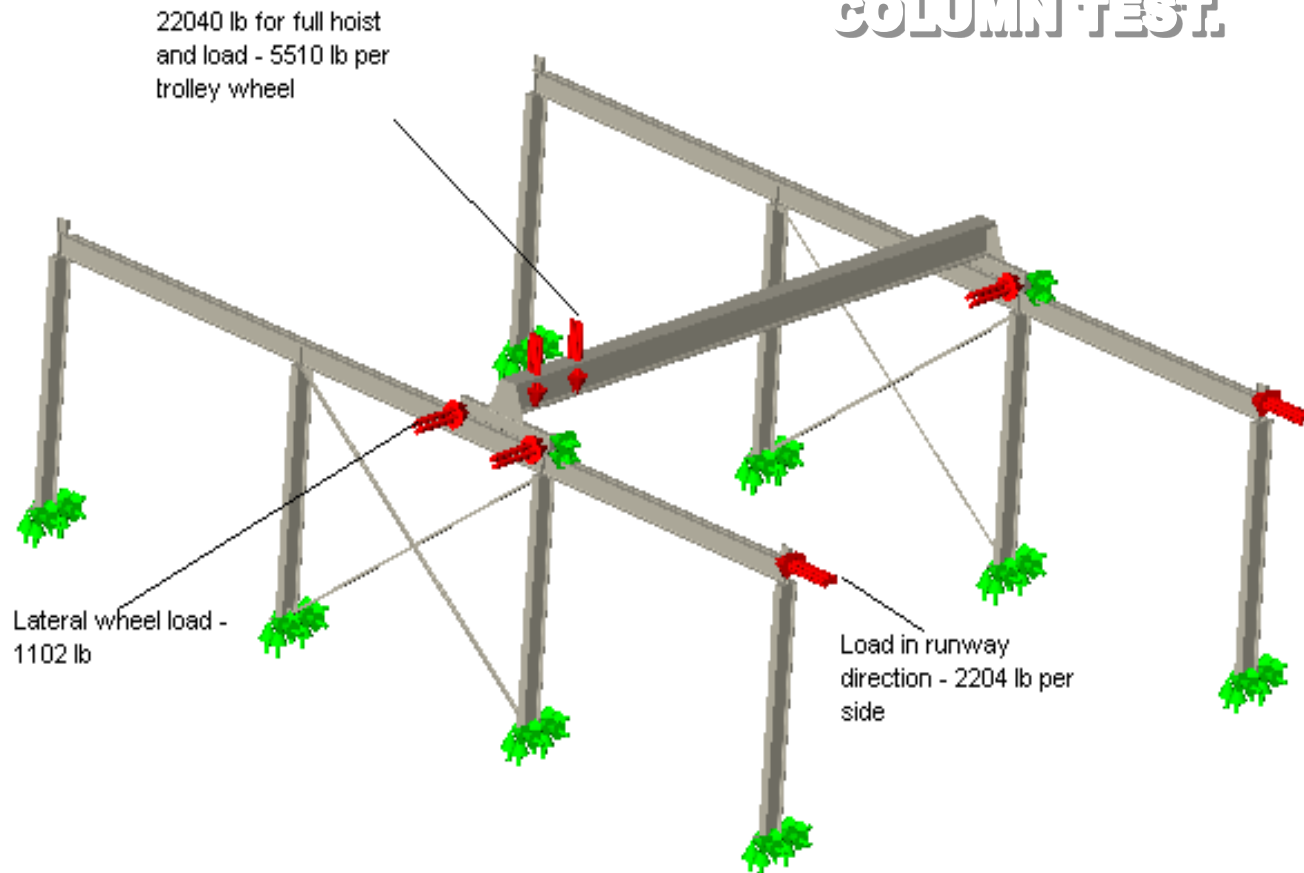


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GENERAL ARRANGEMENT COLUMN TEST

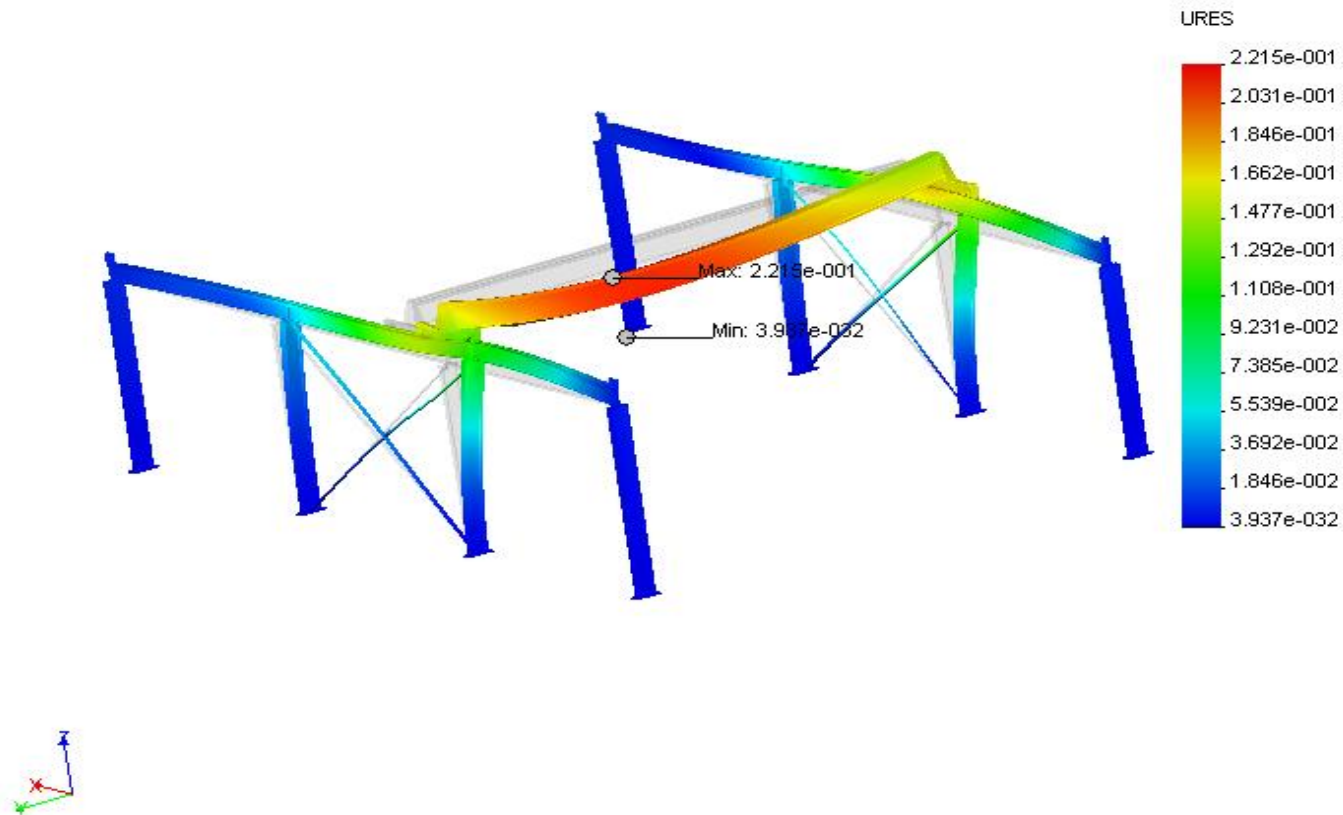


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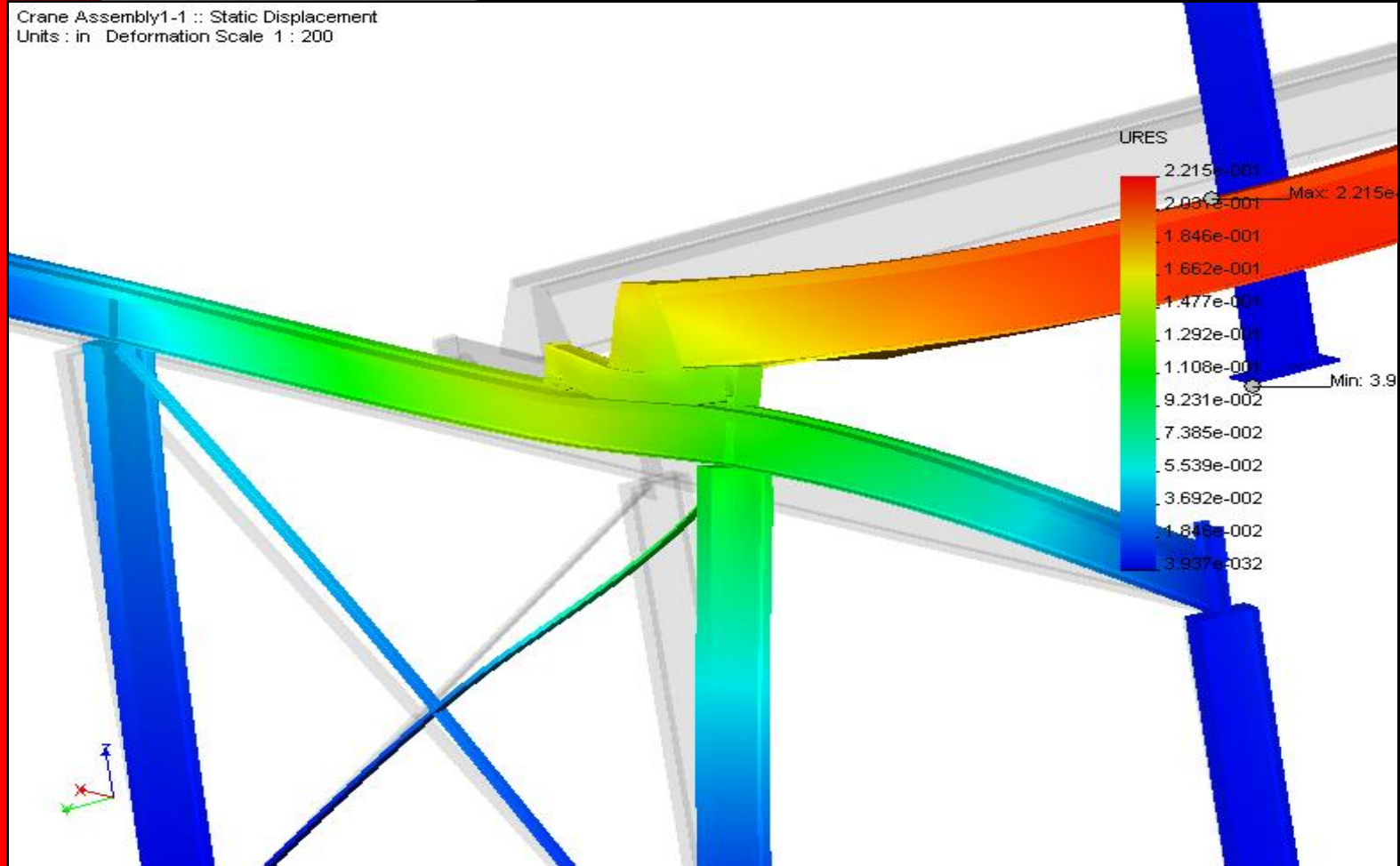


Crane Assembly1-1 :: Static Displacement
Units : in Deformation Scale 1 : 200



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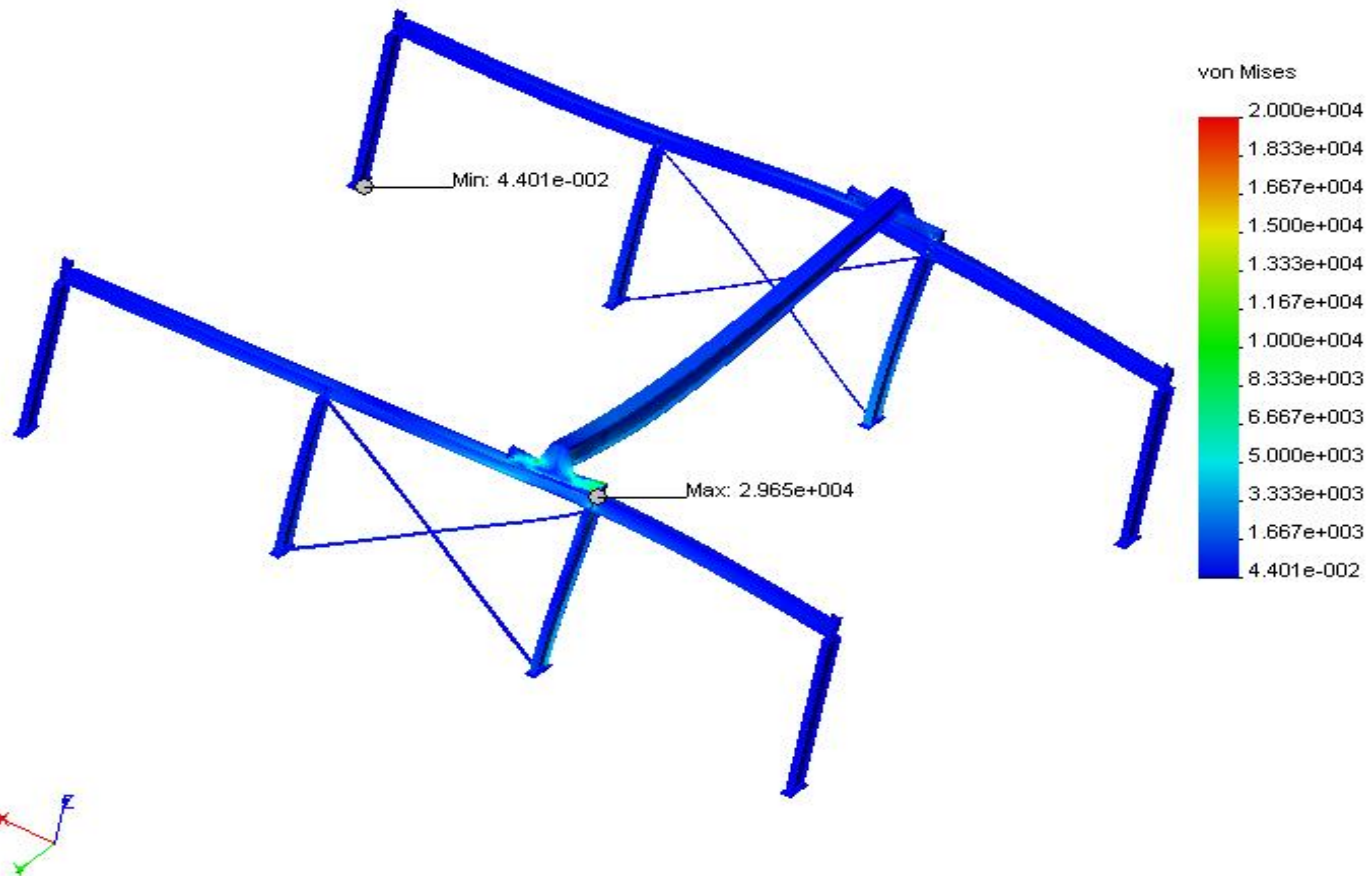


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Crane Assembly1-1 :: Static Nodal Stress
Units : psi Deformation Scale : 1 : 200

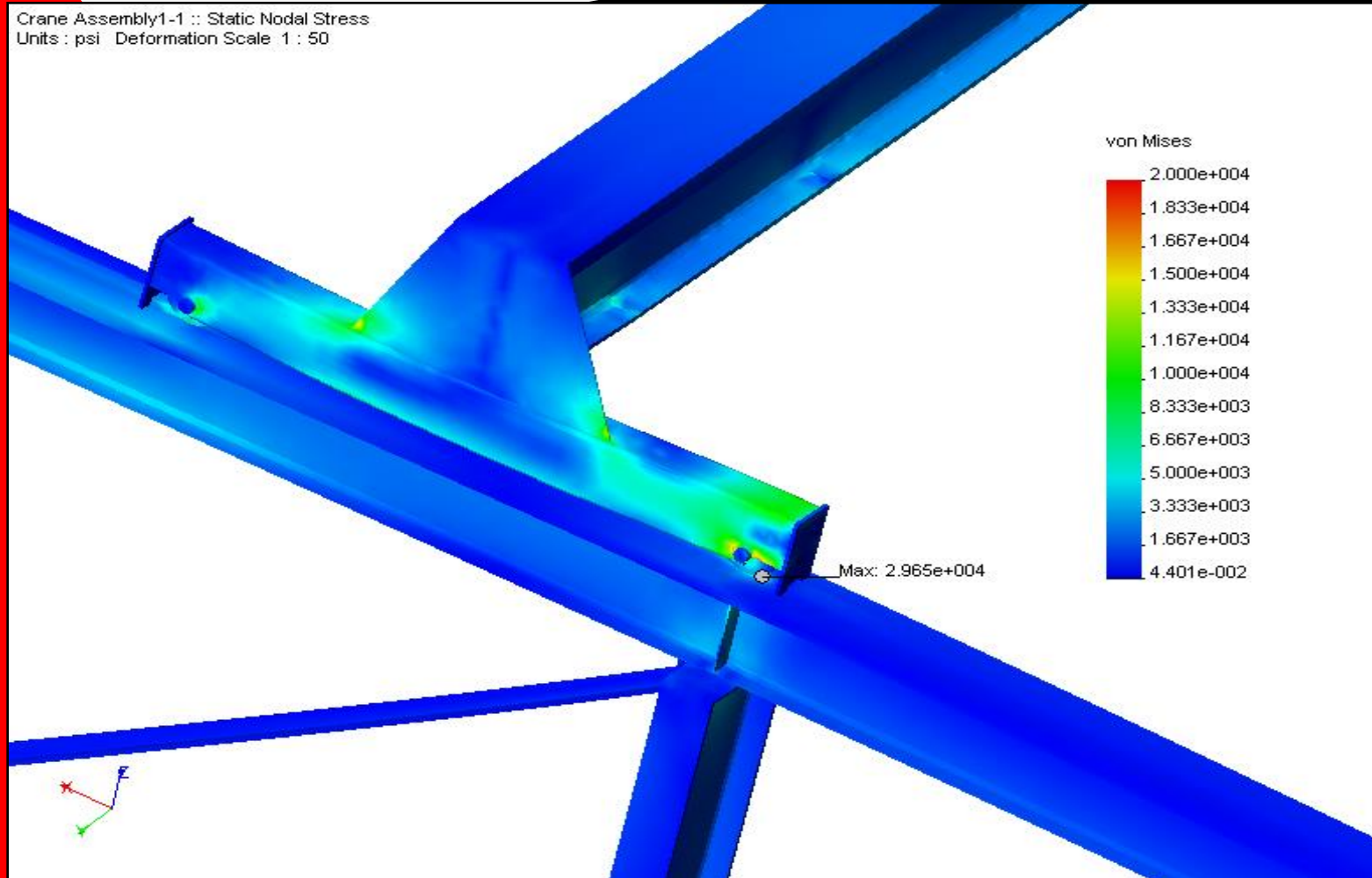


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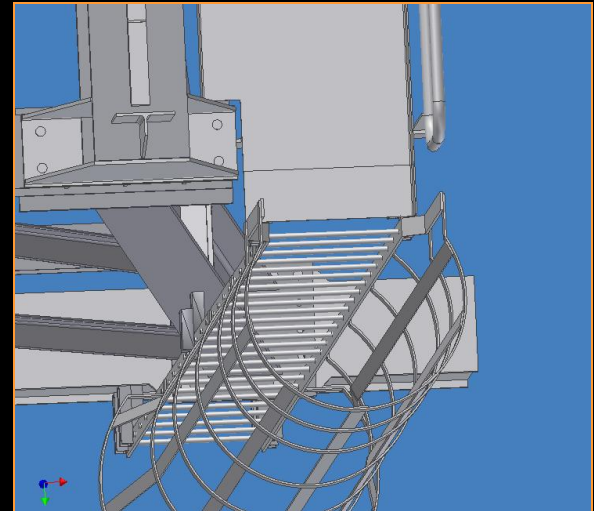
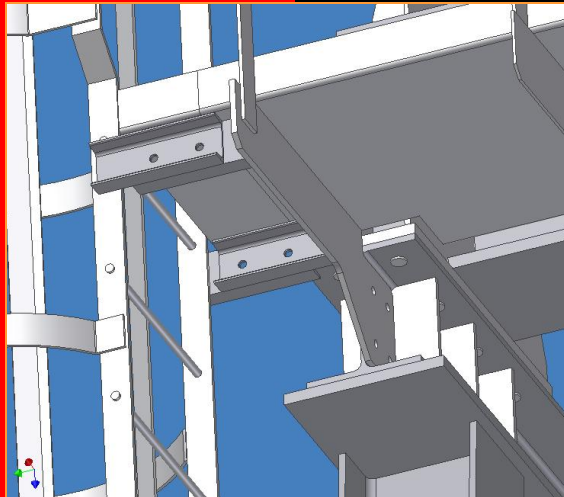
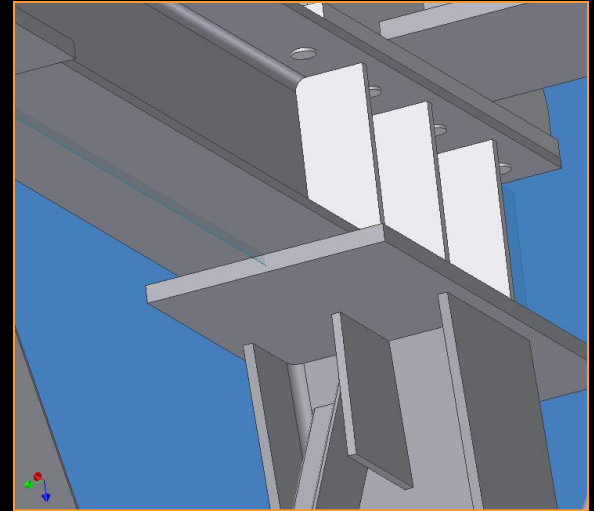
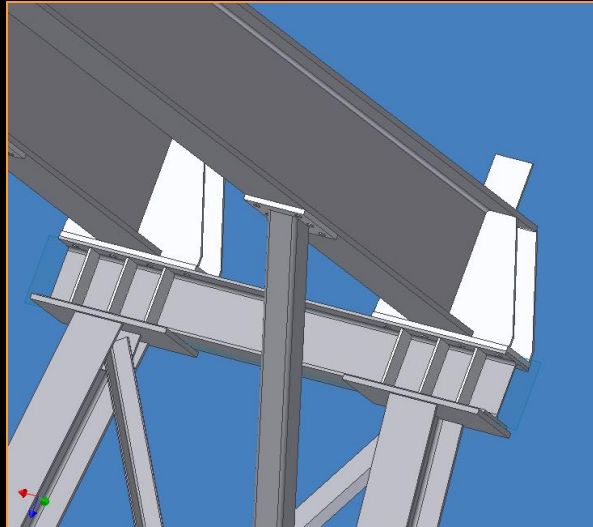
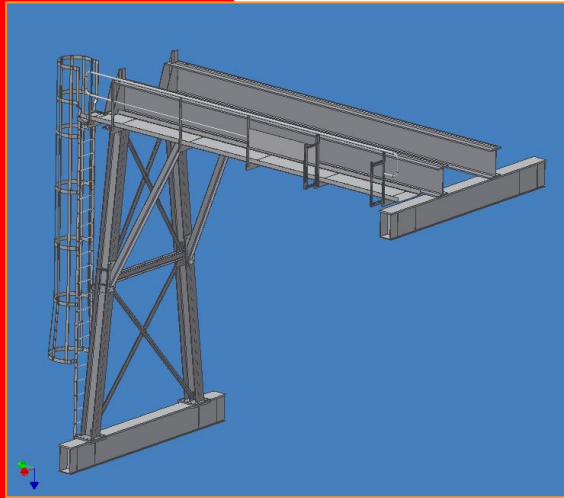


Crane Assembly1-1 :: Static Nodal Stress
Units : psi Deformation Scale 1 : 50



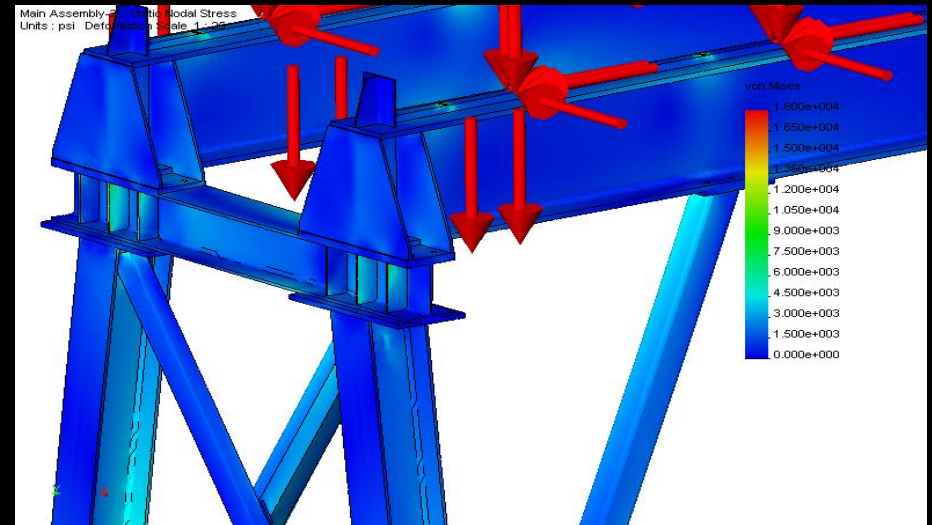
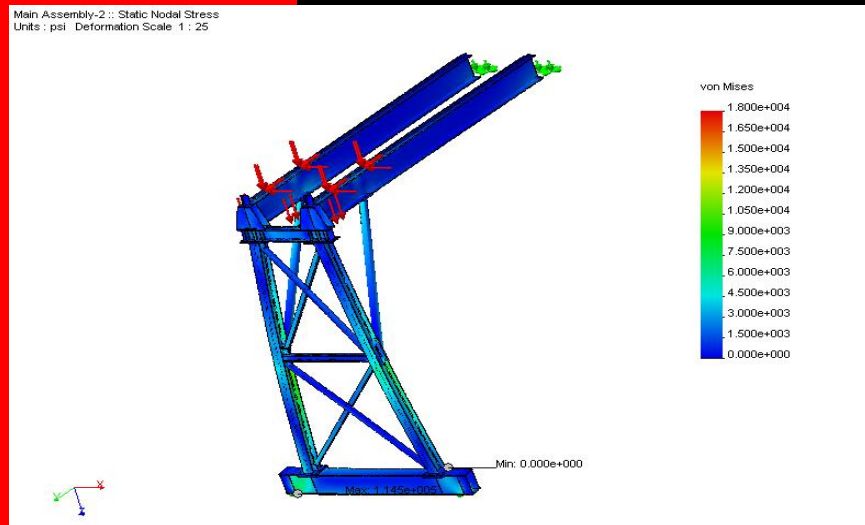
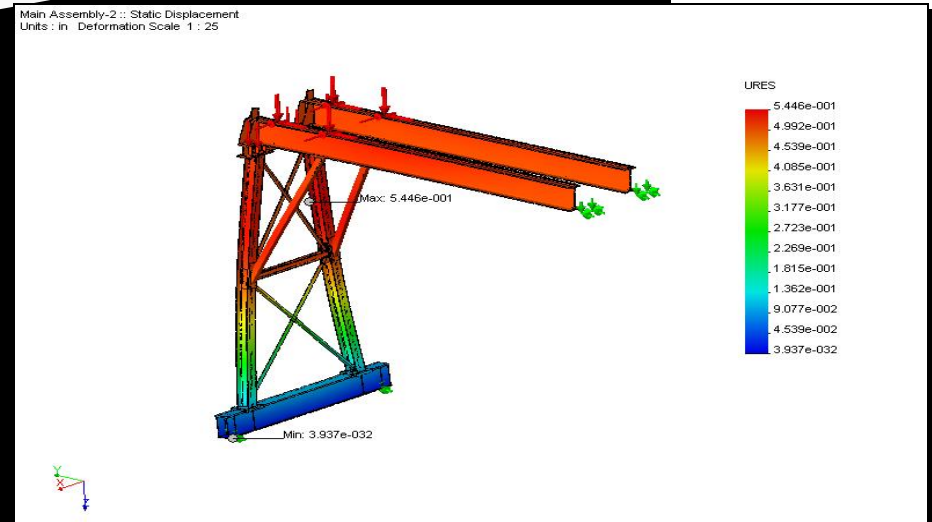
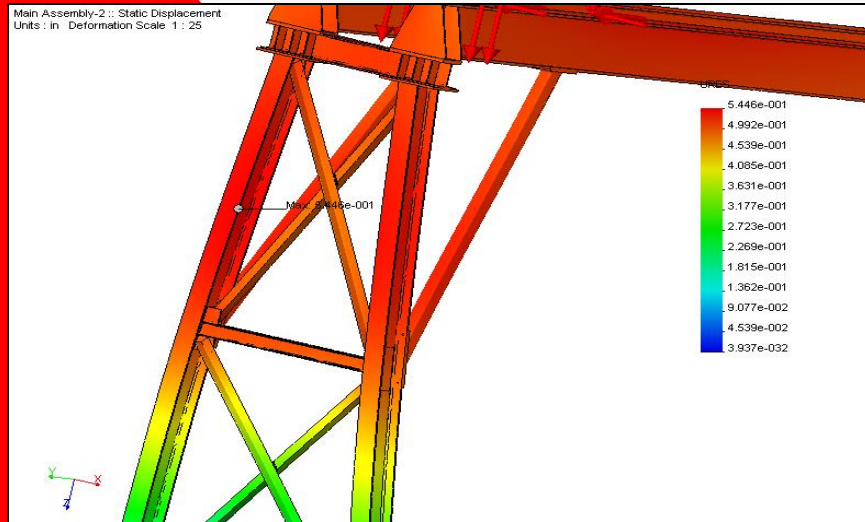
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3D modeling

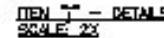


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F.E.A. on crane structure



Crane drawing (sample)

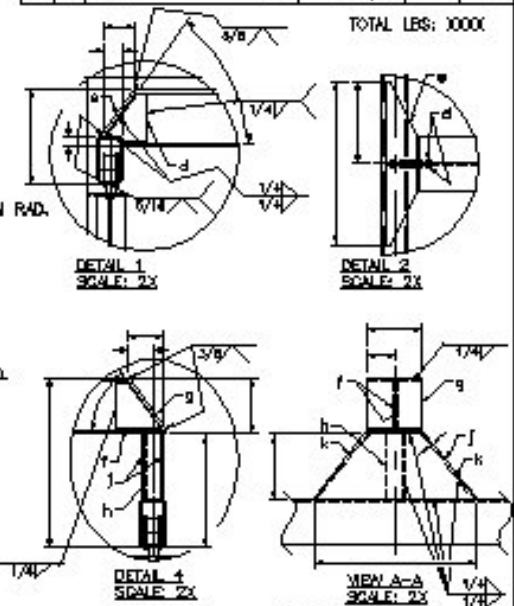


BEVEL EDGES TO CLEAR BEAM RAD.


MEMO - DETAILS
SCALE- 2X

ITEM "d" - DETAILS
SCALE- 2x

ITEM "a" - DETAILS
SCALE 2X

TOTAL LBS: XXXX

REFERENCE DRAWING NO. GMX000000001_2



ENGINEERING and MANAGEMENT LTD
 (P.O.) 10452-178 Street, Edmonton, Alberta T6C 7B8
 Phone: (780) 487-8334
 Fax: (780) 487-8334

THE CHAIRMAN AND BOARD MEMBERS HAVE THE HONOR OF ANNOUNCING THE RESULTS OF THE 24th ANNUAL MEETING OF THE BOARD OF DIRECTORS OF THE CITY OF NEW YORK.	ALL MEMBERS ARE IN FULL AND ACTIVE MEMBERSHIP UNDER THE BOARD OF DIRECTORS LEADER: 400 4-1/2" ANNUAL MEETING
--	--

TITLE: XX TEN T99C GRAMES		OWN BY:	DATE:
CUSTOMER:		CHK'D BY: -	DATE: -
V.O. #		SCALE:	SPR. NO. 10000
V.O. # 100000		OWN. 000000000001	REV. -

- ELEVATION VIEW**
- NOTES:
1. REMOVE ALL SHARP CORNERS.
 2. ALL CONTAMINATORS FOR STRUCTURAL STEEL TO BE REMOVED.
 3. ALL WELDS TO BE 1/4" FILLET, HYDROGEN ELECTRODES EXCEPT UNLESS NOTED OTHERWISE.
 4. ALL WELDS TO CONFORM TO U.S.A. AND LATER.
 5. STEEL IS TO CONFORM TO U.S.A. A572/13/442.
 6. BRUITS ARE TO CONFORM TO ASTM A502, A504 (A57) UNLESS NOTED OTHERWISE.
 7. SOME WELDS ARE TO BE CUTTED FOR QUALITY.
 8. SURFACE PREPARATION S.A.C. 012.
 9. PAINT CUSTOMER DESIGNED COLOR.
 10. DIMENSIONS OF RECTANGULAR PLATES ONLY IN PART LIST.
 11. DRUMS IS DESIGNED FOR 10 TON LIFTING CAPACITY.
 12. ENTRANCE AND WHEEL BY OTHERS.
 13. BUILDING CONSTRUCTION, MATERIALS AND CONCRETE BY OTHERS.
 14. 3-6000 IS IN THE ADDITION TO THE EXISTING 7 TON CRANE ON THE SAME PLATFORM SYSTEM.
 15. CRANE IS TO BE REMOVED TO BE REPAIRED WITHIN AT 18-24 HOURS, 20'-6" AT ANY TIME.

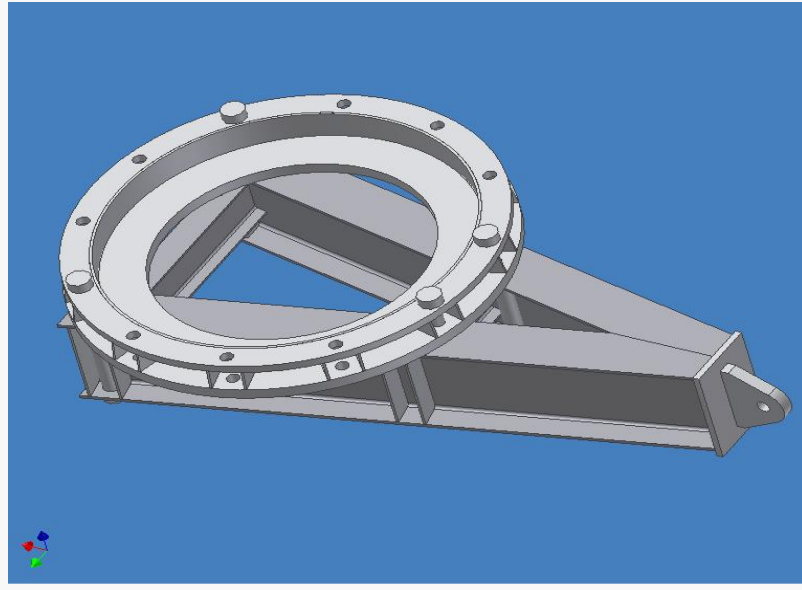
EXPERIMENTAL DATA

LOAD - 10 TON
SPAN - 10'-0 3/8"
LIFTING HEIGHT - 12'-1 1/4"
WEIGHT OF WHEELS - 1800 LBS.
WEIGHT OF CHASSIS - 3100 LBS.
MAX. STATIC PUSHER LOAD - 1000 LBS.
MAX. SPECT PUSHER LOAD - 120 LBS.
MAX. LATERAL WHEEL LOAD - 9.1 TON

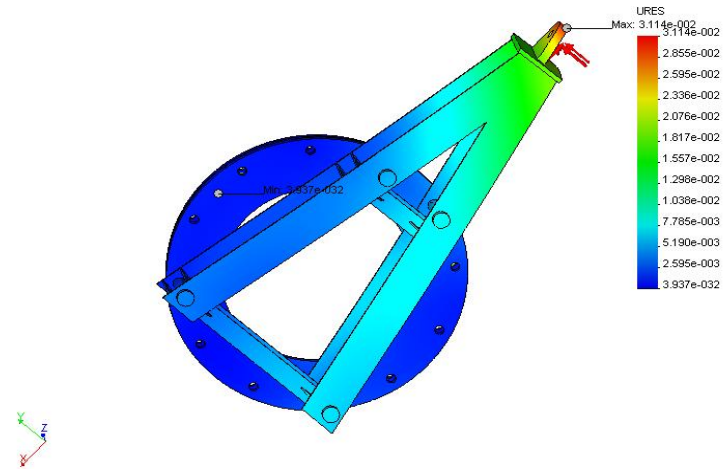
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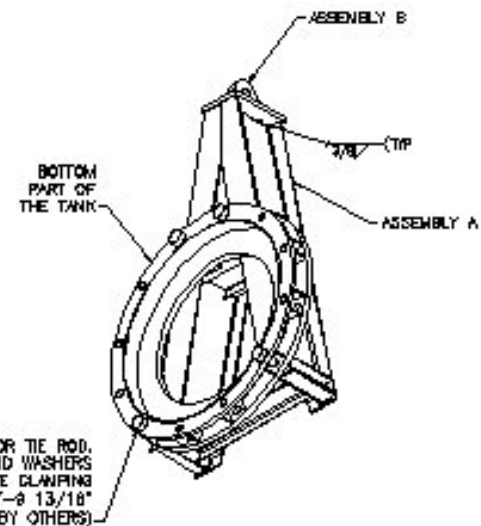
Tailing beam for 185,000 lbs tank



Tailing Beam Assembly-Lift at 0 deg :: Static Displacement
Units : in Deformation Scale 1 : 100



Tailing beam for 185,000 lbs tank



2. BOLT/TIE ROD MATERIAL SHOULD BE ADEQUATE OR BETTER THAN GR2 BOLT WITH MIN. PROOF STRENGTH OF XX KSI.
3. MAX. CLAMPING LOAD = XXXXX LBS/BOLT.
4. PRETORQUE BOLTS TO XXXX FT-LB.

70	VOL-#	XXXXXXXXXX	DWG GM XXXXXXOABO1	REV -
----	-------	------------	--------------------	-------

ITEM	QTY	DESCRIPTION/MATERIALS	LENGTH	WEIGHT
A	—	5252 DRIVE END-00000000A0002	—	10000
B	—	5252 DRIVE END-00000000A0003	—	1000

TOTAL LBS: XXXX

[illegible]

				NAME: [REDACTED] NAME LAYOUT				GR'D BY - DATE -	
				CLIENT: [REDACTED]				SCALE: 1"=20'-0" (1"=10'-0")	
REV	DATE	DESCRIPTION	BY	CHK'D BY	DATE	BY	DATE	BY	DATE
1	01/01/01	ISSUED FOR PERMIT	[REDACTED]	[REDACTED]	01/01/01	[REDACTED]	01/01/01	[REDACTED]	01/01/01

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Telescopic lifting beam

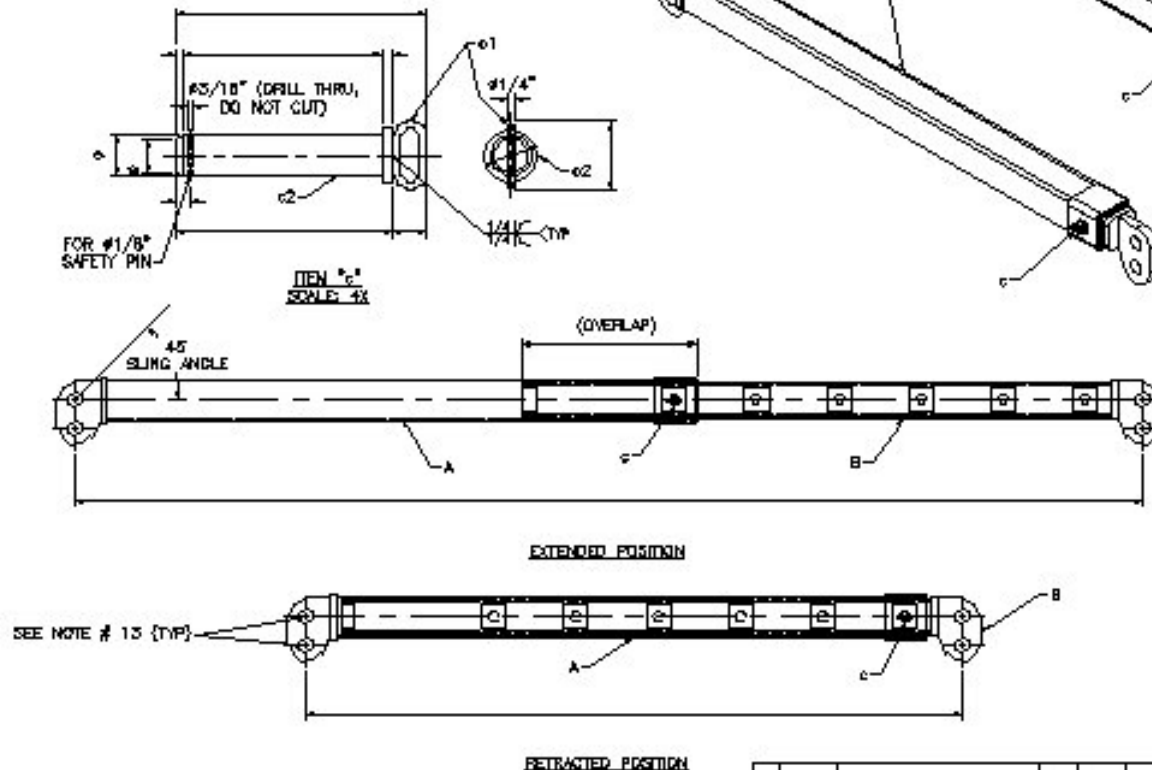


NOTES:

1. REMOVE ALL SHARP EDGES.
2. ALL DIMENSIONS FOR STRUCTURAL STEEL TO BE CONTROLLING.
3. ALL DIMENSIONS TO BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. ALL DIMENSIONS TO BE 1/4" UNLESS OTHERWISE SPECIFIED.
5. WELD IS TO CONFORM TO CAN. B32.1/4.4.1.
6. BEAMS ARE TO CONFORM TO AISC A36, 5/8" UNLESS NOTED OTHERWISE.
7. SOME WELDED LINES ARE DRAFTED FOR CLARITY.
8. SURFACE FINISH: INDUSTRIAL GRADE.
9. PAINT: CUSTOMER'S CHOICE.
10. LIFTING BEAM IS DESIGNED FOR MAX. LIFTING CAPACITY OF XX TON ON XXXXX LBS. DIMENSIONS BETWEEN LIFTING POINTS.
11. AT THE EXTREME LIFTING BEAM IS DESIGNED FOR LATERAL LOADING ONLY.
12. LIFTING BEAM IS DESIGNED FOR MINIMUM TOP BEAM ANGLE OF 45°.
13. LINES ARE DESIGNED FOR XX TON (XXXXX LBS) CAPACITY - XX TON (XXXXX LBS) CAPACITY.
14. BEAM IS DESIGNED TO BE COMPLIANT WITH ALBERTA OCCUPATIONAL HEALTH AND SAFETY CODE 2003 03.
15. BEAM IS DESIGNED TO BE COMPLIANT WITH ALBERTA OCCUPATIONAL HEALTH AND SAFETY CODE 2003 03.
16. BEAM IS DESIGNED TO BE COMPLIANT WITH ALBERTA OCCUPATIONAL HEALTH AND SAFETY CODE 2003 03.

ITEM	QTY	DESCRIPTION/MATERIALS	LENGTH	WEIGHT
A	—	SEE DIM. GNDXXXXXAB01A	—	—
B	—	SEE DIM. GNDXXXXXAB01B	—	250
01	1	ROUND BAR (SEE AISC 360)	—	1
02	1	6"x6" ROUND BAR	—	7

TOTAL WEIGHT: XXXX LBS

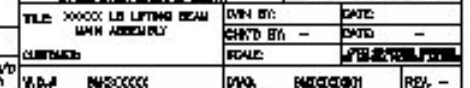


REFERENCE DRAWING NO. —

		ENGINEERING and MANAGEMENT LTD	
10445-170 Street, Edmonton, Alberta T6E 1M6		Phone: (780) 481-0334	
Fax: (780) 481-0434		E-Mail: info@genmark.com	
TITLE: XX TON SPREADER BEAM		DATE: —	
GENERAL ASSEMBLY		DRAWN BY: —	
CHECKED BY: —		DATE: —	
SCALE: —		APPROVED BY: —	
V.D.A. GNDXXXXX		D.W. GNDXXXXXAB01	
REV. —		REV. —	

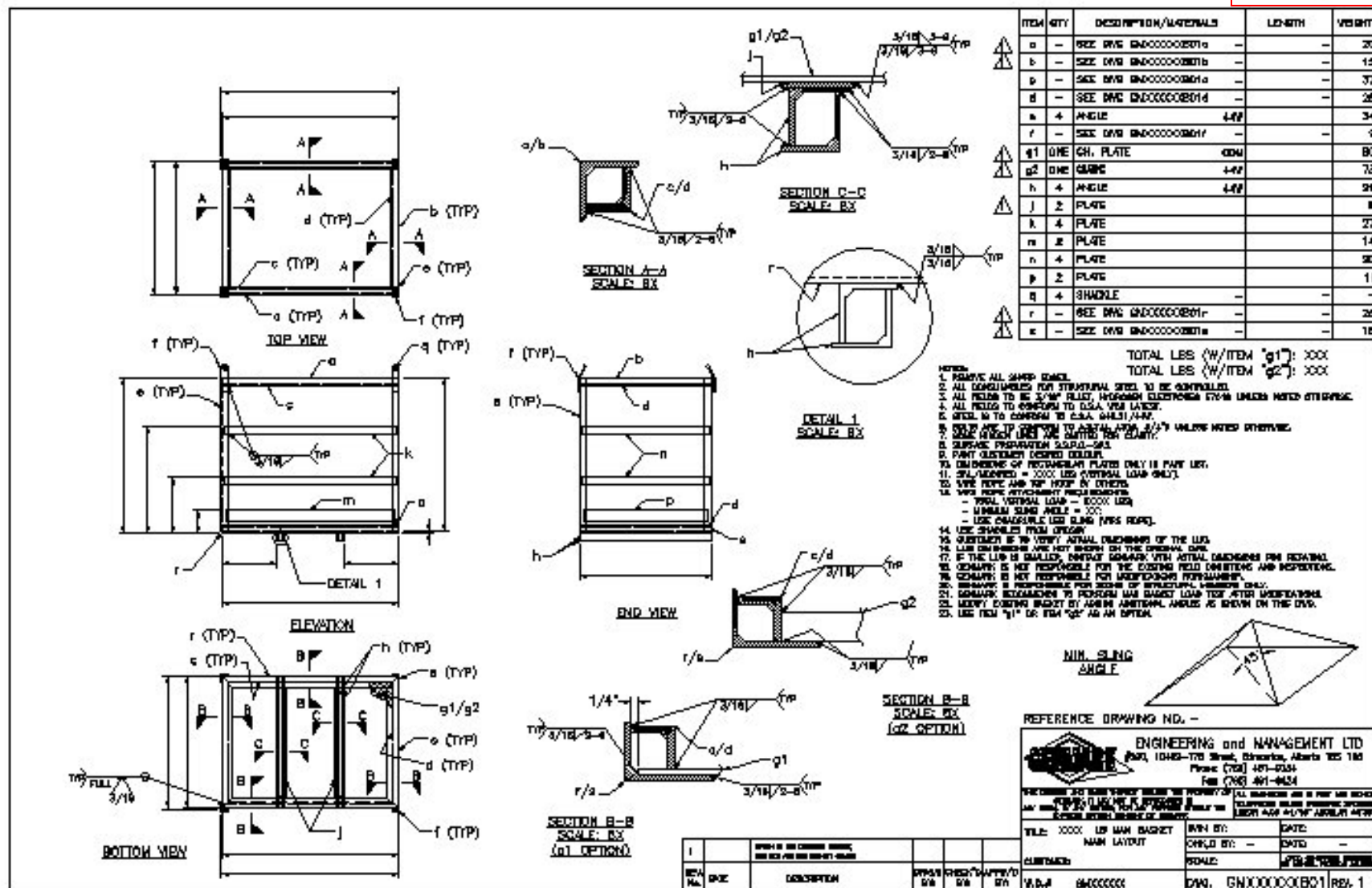
REV.	DATE	DESCRIPTION	BY	CHKD.	APP'D.

Standard lifting beam



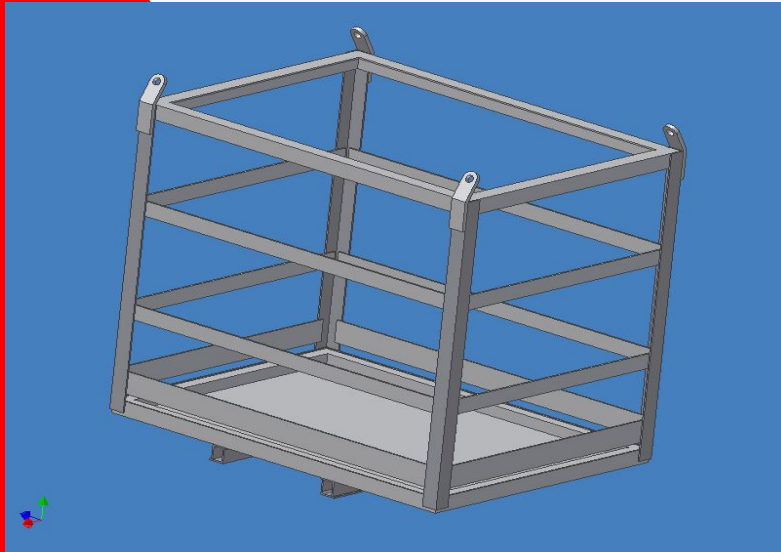
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Man basket

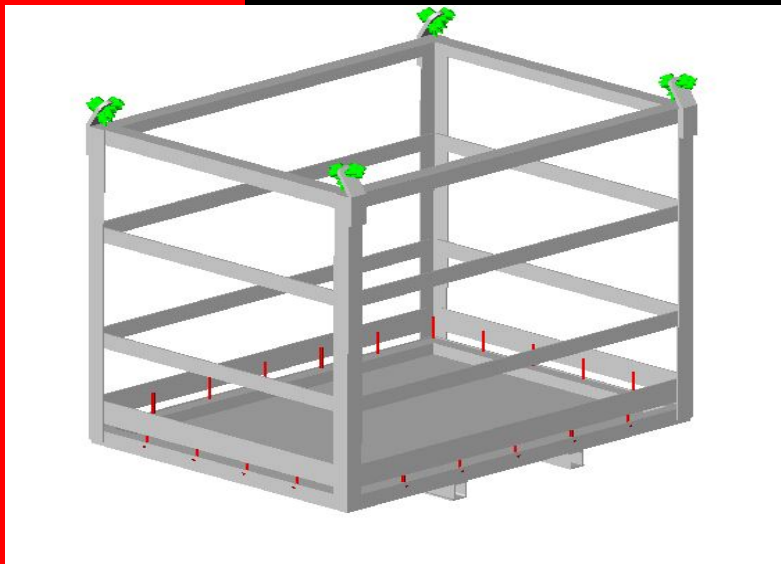
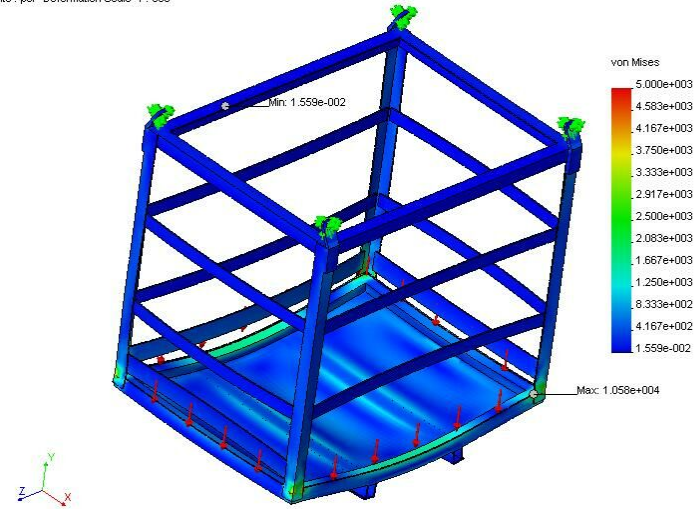


“INNOVATIVE SOLUTIONS TO SERVE YOU BEST!”

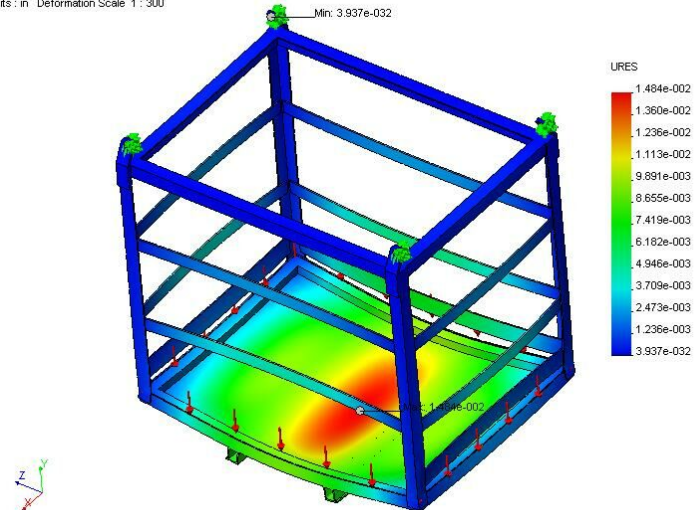
Man basket



1000 lb man basket assembly-1 : Static Nodal Stress
Units : psi Deformation Scale 1 : 300



1000 lb man basket assembly-1 : Static Displacement
Units : in Deformation Scale 1 : 300



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**GENMARK is ready to provide
our CUSTOMER with the following:**

- The latest engineering design technology**
- Over 25 years of engineering experience**
- Availability and capability to successfully complete any engineering task**
- Experience and knowledge for new products**
- High quality and accuracy**
- Excellent value for your money**