



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Tom Cat Designs LLC Protective Hull Modeling & Simulation Results For Iteration 1

Sebastian Karwaczynski

24- October- 2011

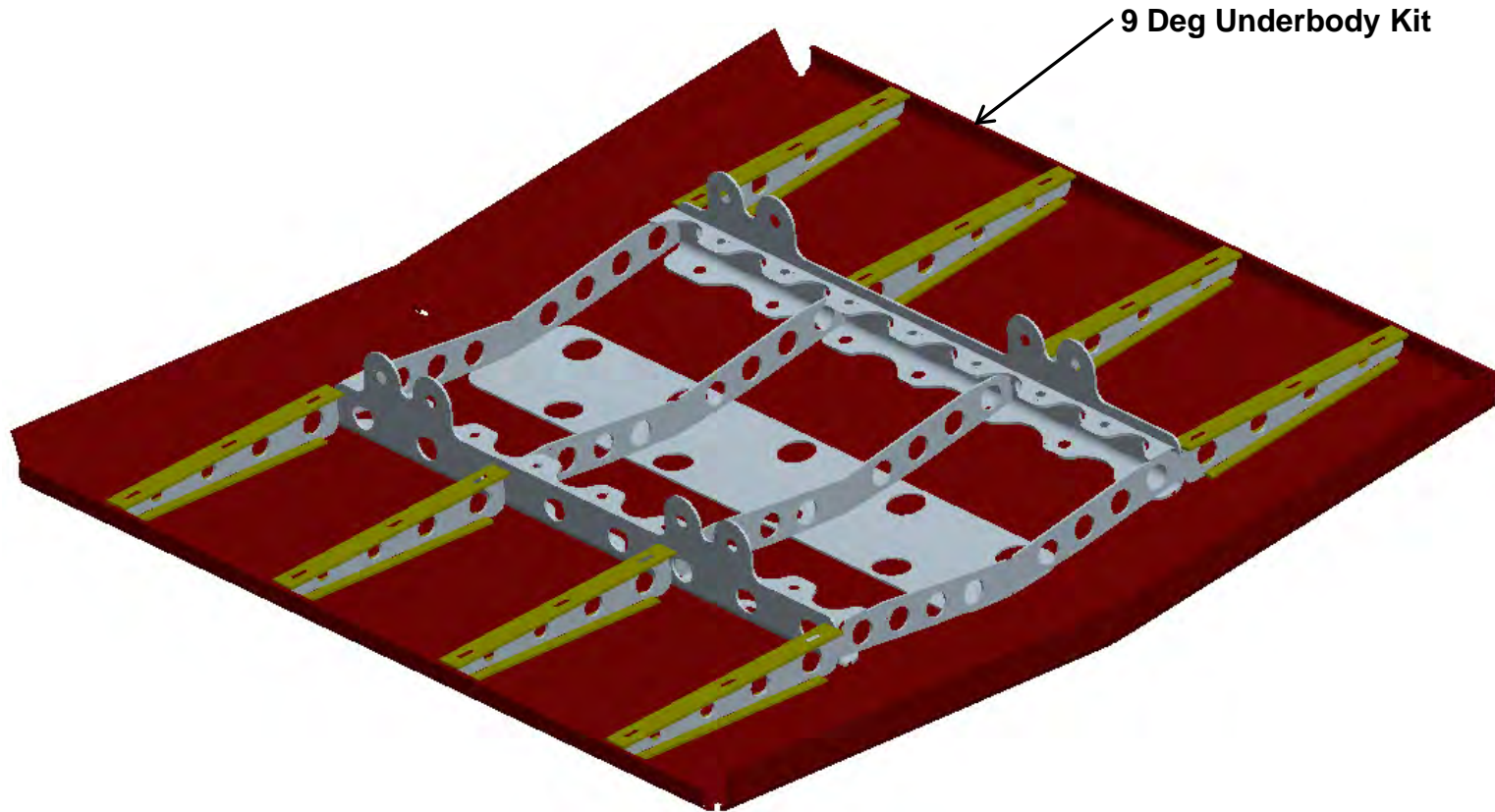
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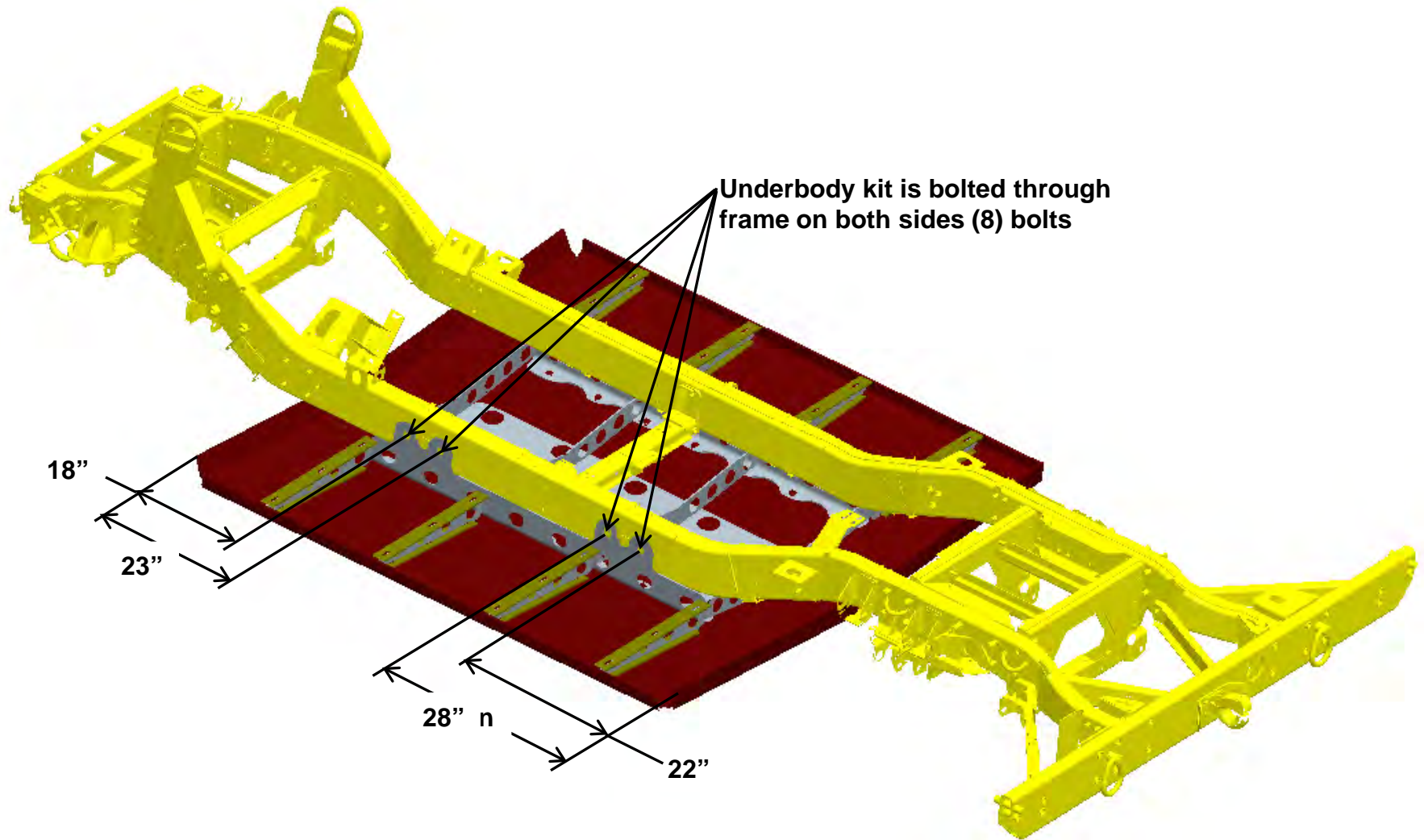
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a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

- **Fit and Function Analysis**
- **Mobility Analysis**
- **Blast Analysis**
- **Design Suggestions**
- **Conclusion**





Underbody kit is bolted through frame on both sides (8) bolts

18"

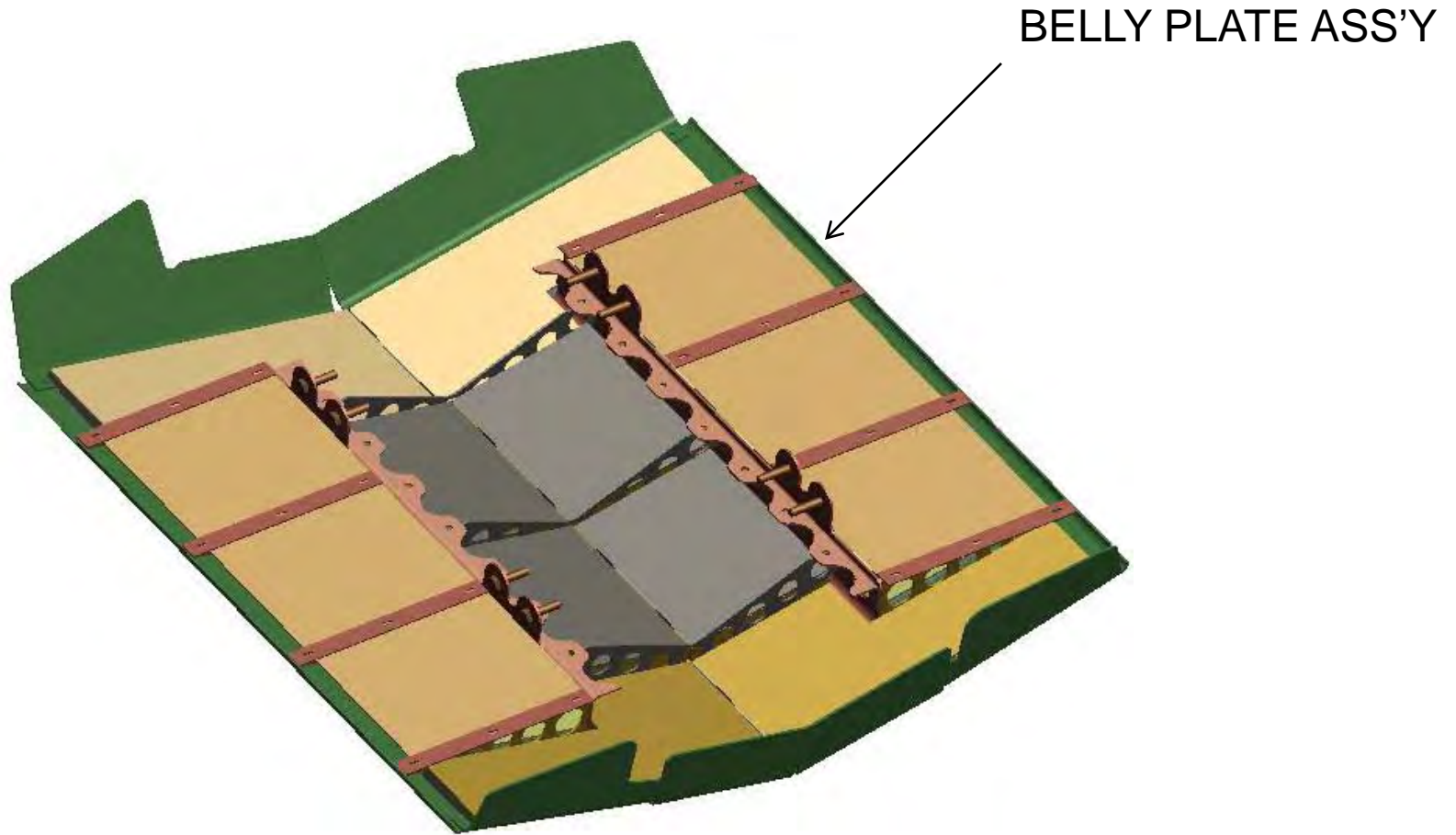
23"

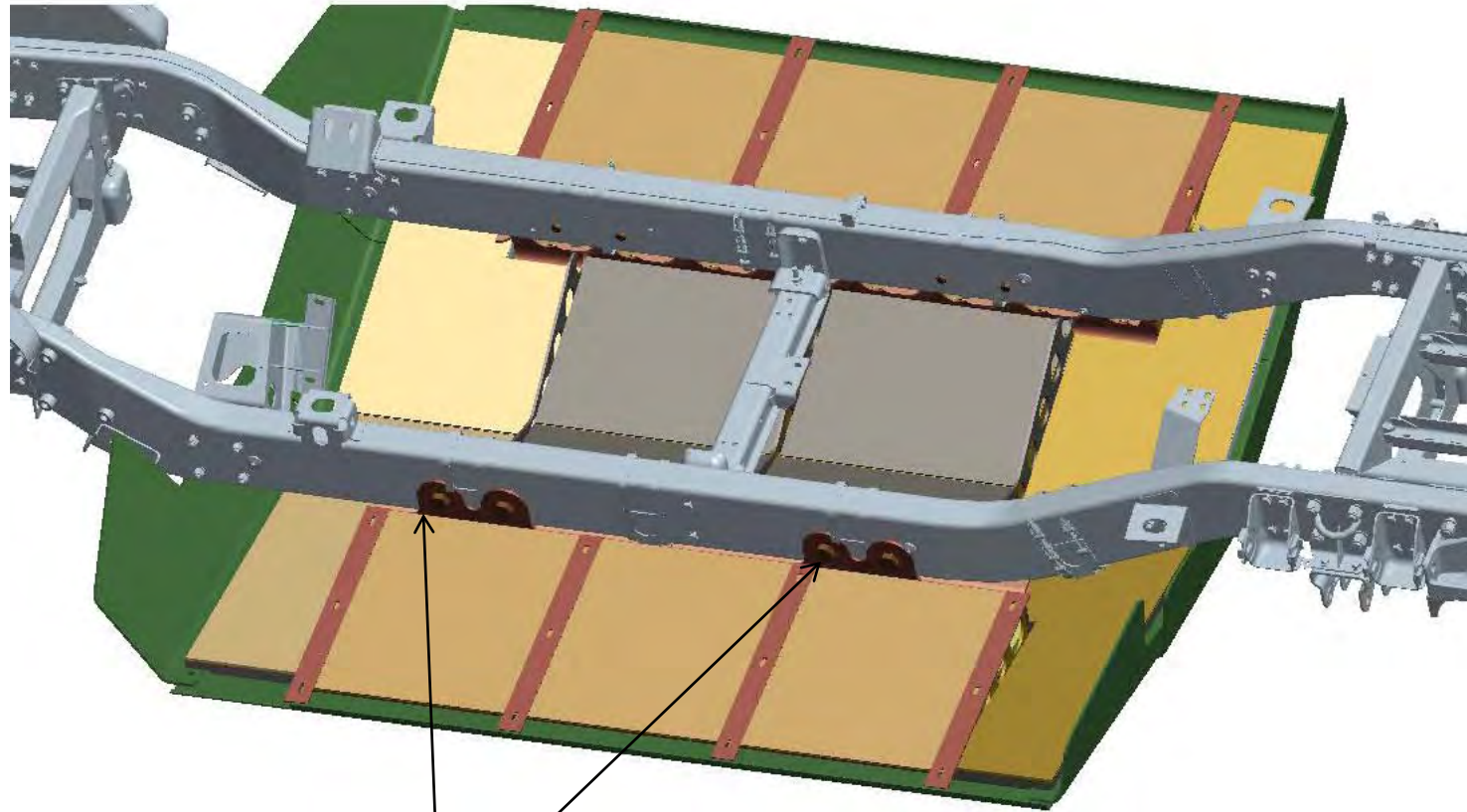
28" n

22"

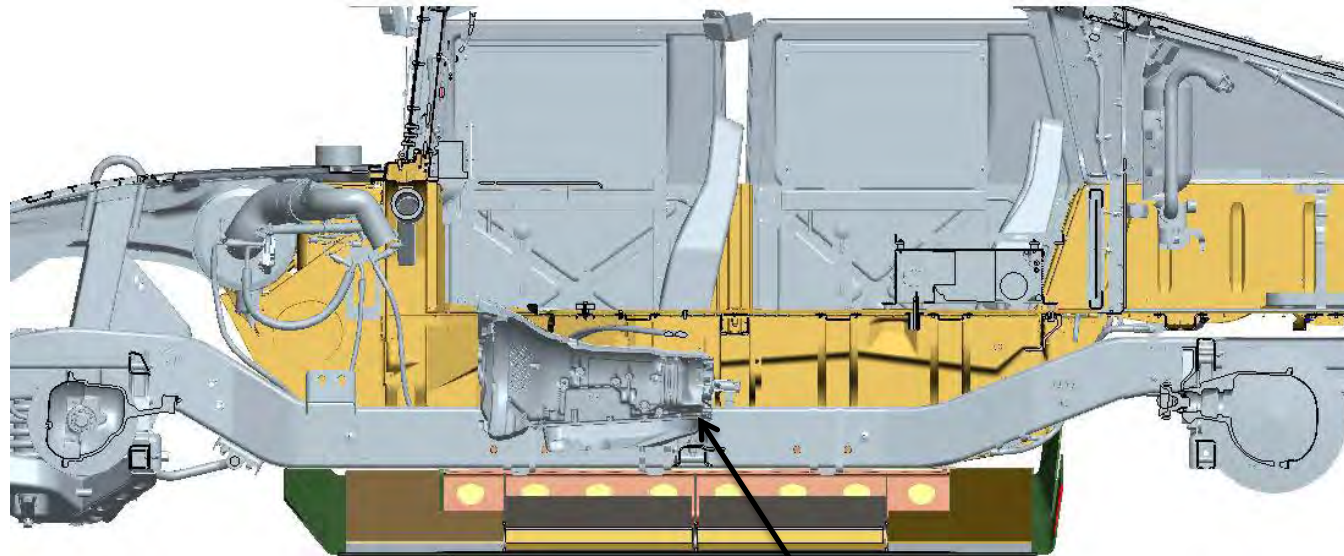
- During installation/removal of the underbody kit, the attachment locations are potentially difficult to reach.
- All 8 bolts are blind operation.



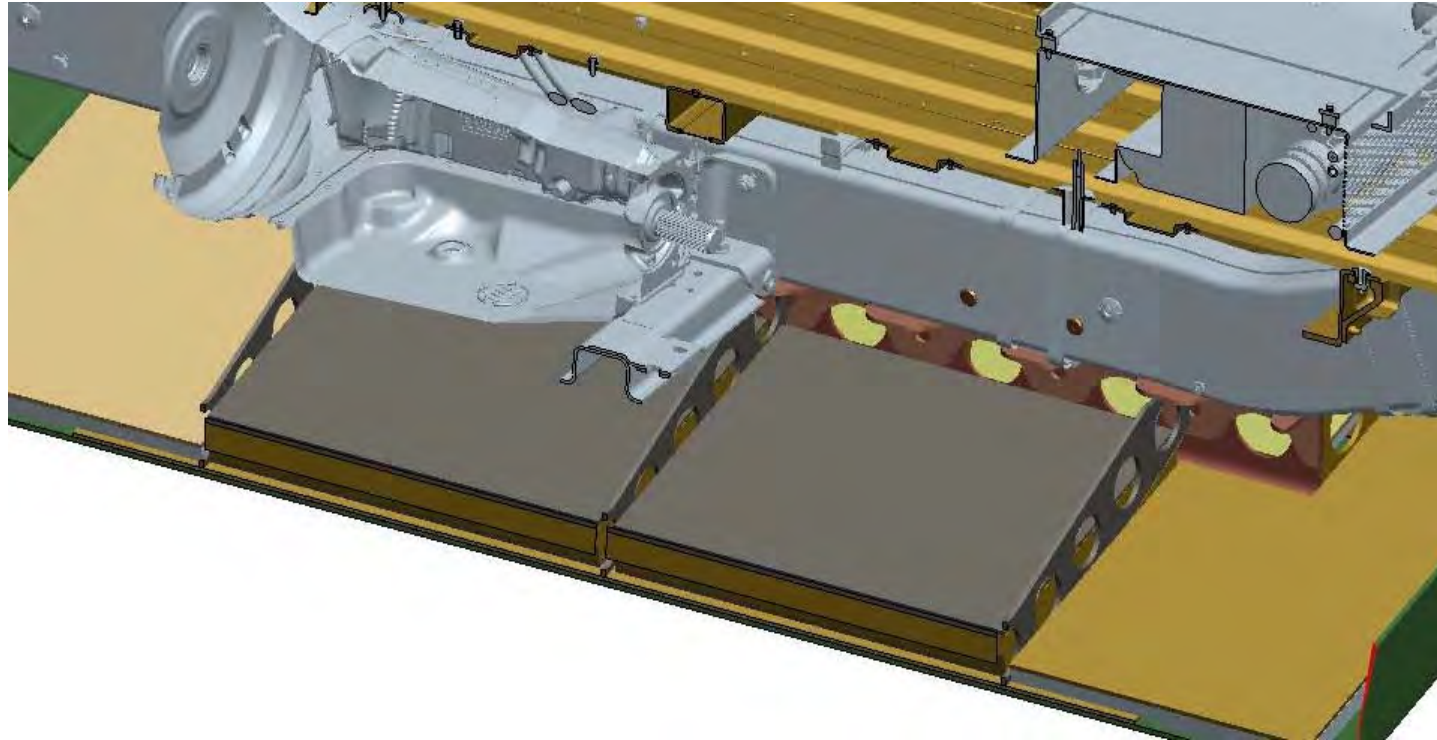


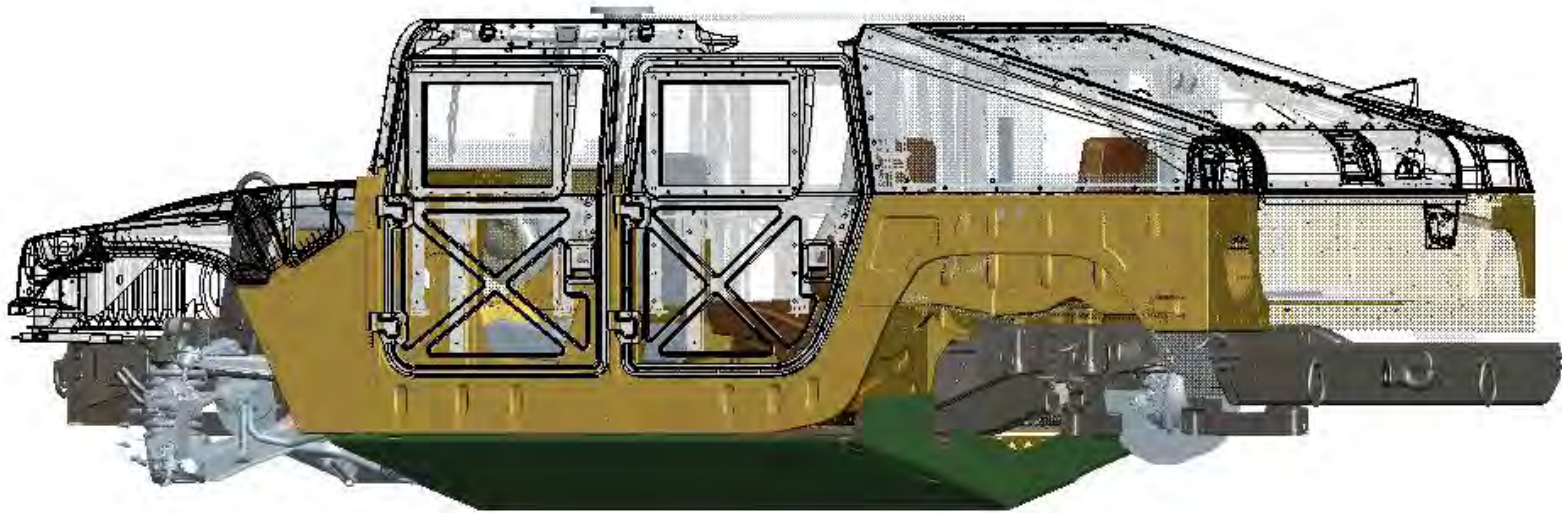


BELLY PLATE IS BOLTED TO VEHICLE FRAME



Transmission housing





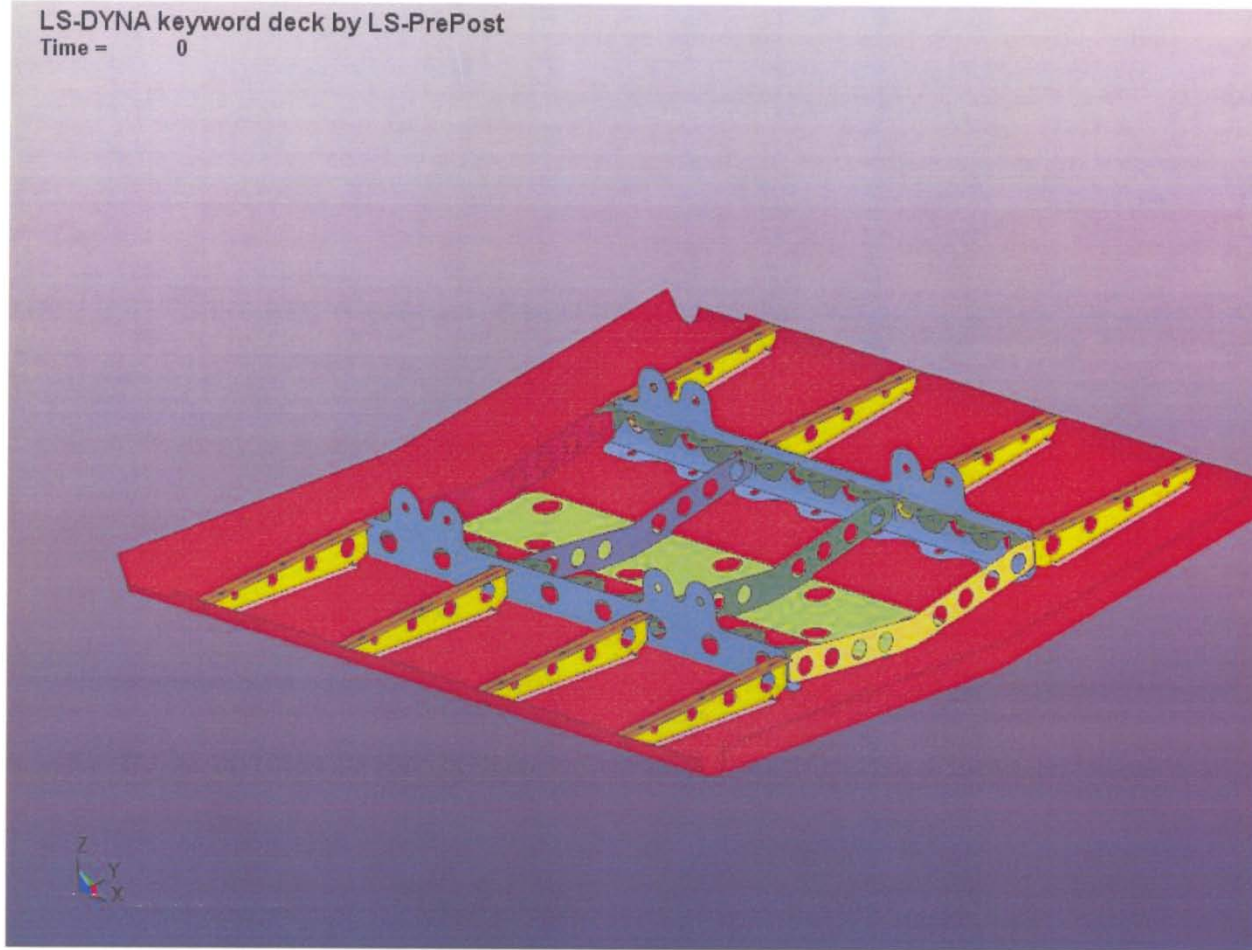
- During installation/removal of the underbody kit, the attachment locations are potentially difficult to reach.
- All 8 installation bolts are blind operation.

Maneuver	Requirement	Baseline w/V-hull			Baseline w/OGPK & V-hull		
AVTP	43 MPH	44			42		
SS	40%	93.0			87.6		
RMS 1.00	30 MPH	50			50		
RMS 1.50	20 MPH	20			20		
RMS 2.00	15 MPH	10			10		
RMS 2.50	13 MPH	5			5		
HR4	50 MPH	50			50		
HR6	16 MPH	45			45		
HR8	15 MPH	35			35		
HR10	5 MPH	30			30		
CLEARANCE - HULL TO GROUND (IN)							
STEP	18 IN	Front	Middle	Rear	Front	Middle	Rear
	5	5.2	4.0	2.8	5.2	4.0	2.7
	6	5.0	3.5	2.0	5.0	3.5	2.0
	7	4.7	3.0	1.3	4.8	3.0	1.2
	8	4.5	2.5	0.5	4.6	2.5	0.5
	9	4.3	2.0	-0.2	4.3	2.0	-0.3
	10	4.0	1.5	-1.0	4.1	1.6	-1.0
	11	3.8	1.0	-1.7	3.9	1.1	-1.8
	12	3.6	0.6	-2.5	3.7	0.6	-2.5
	13	3.4	0.1	-3.2	3.4	0.1	-3.2
	14	3.1	-0.4	-4.0	3.2	-0.4	-4.0
	15	2.9	-0.9	-4.7	3.0	-0.9	-4.7
	16	2.7	-1.4	-5.5	2.8	-1.4	-5.5
	17	2.5	-1.9	-6.2	2.6	-1.8	-6.2
	18	2.3	-2.3	-6.9	2.3	-2.3	-7.0
	19	2.0	-2.8	-7.7	2.1	-2.8	-7.7
	20	1.8	-3.3	-8.4	1.9	-3.3	-8.4

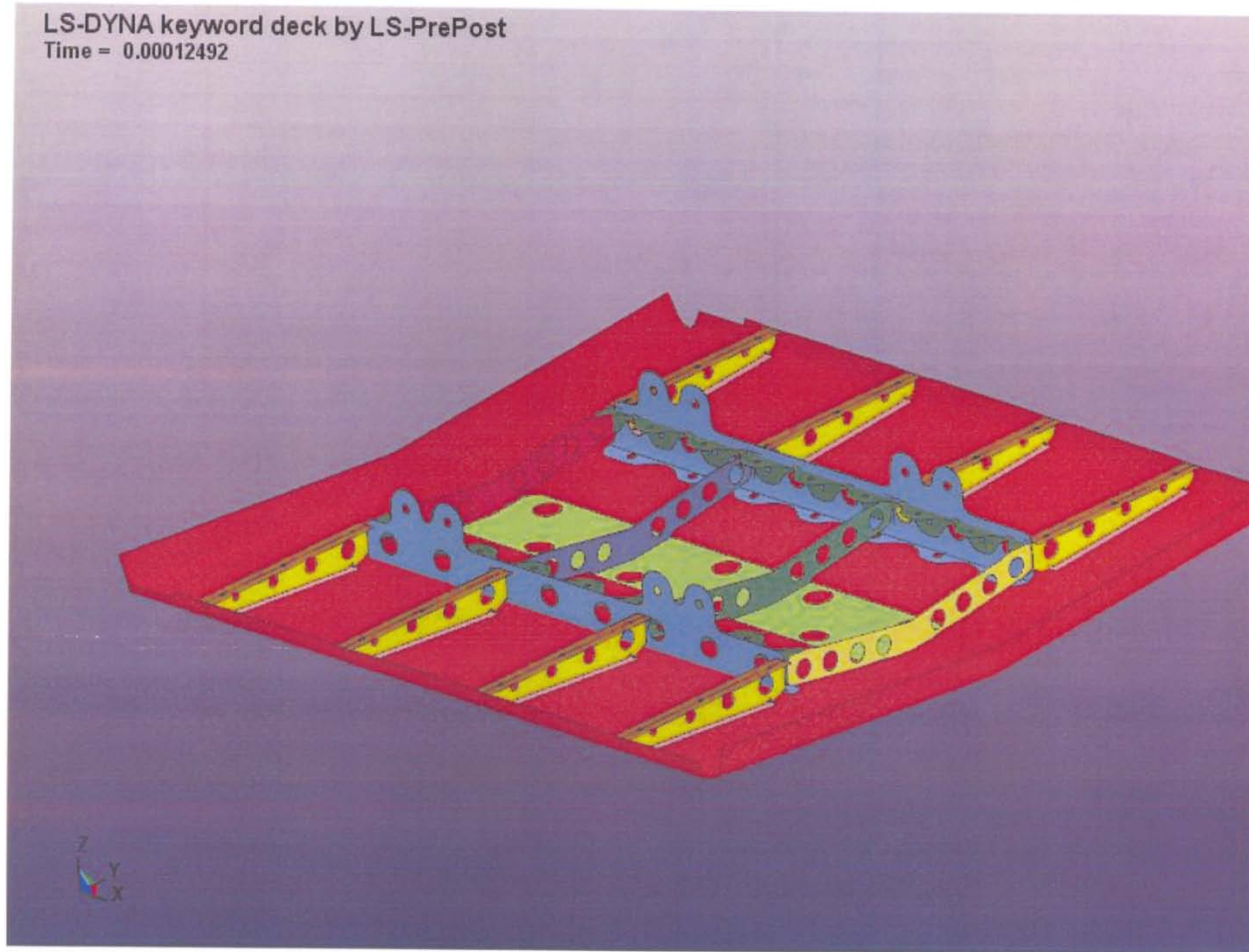
- With the V-hull configuration, **performance improved** for Double Lane Change Maneuver (AVTP) , Side Slope, Ride Quality, and Shock Quality due to lower CG height and increased weight. However, for course roughness's greater than 2.0" RMS and bump heights greater than 8" HR (Half Round) ground/hull **interference occurred.**
- With the V-hull configuration, **performance was reduced** for the Vertical Step due to ground/hull interference—greatest in the rear section (reduced from 18" to 8").
- **Biggest risk is reduction in mobility over obstacles for the V-hull configuration**

- The following slides illustrate blast simulations for both the 9° and 22° V-Hull Designs

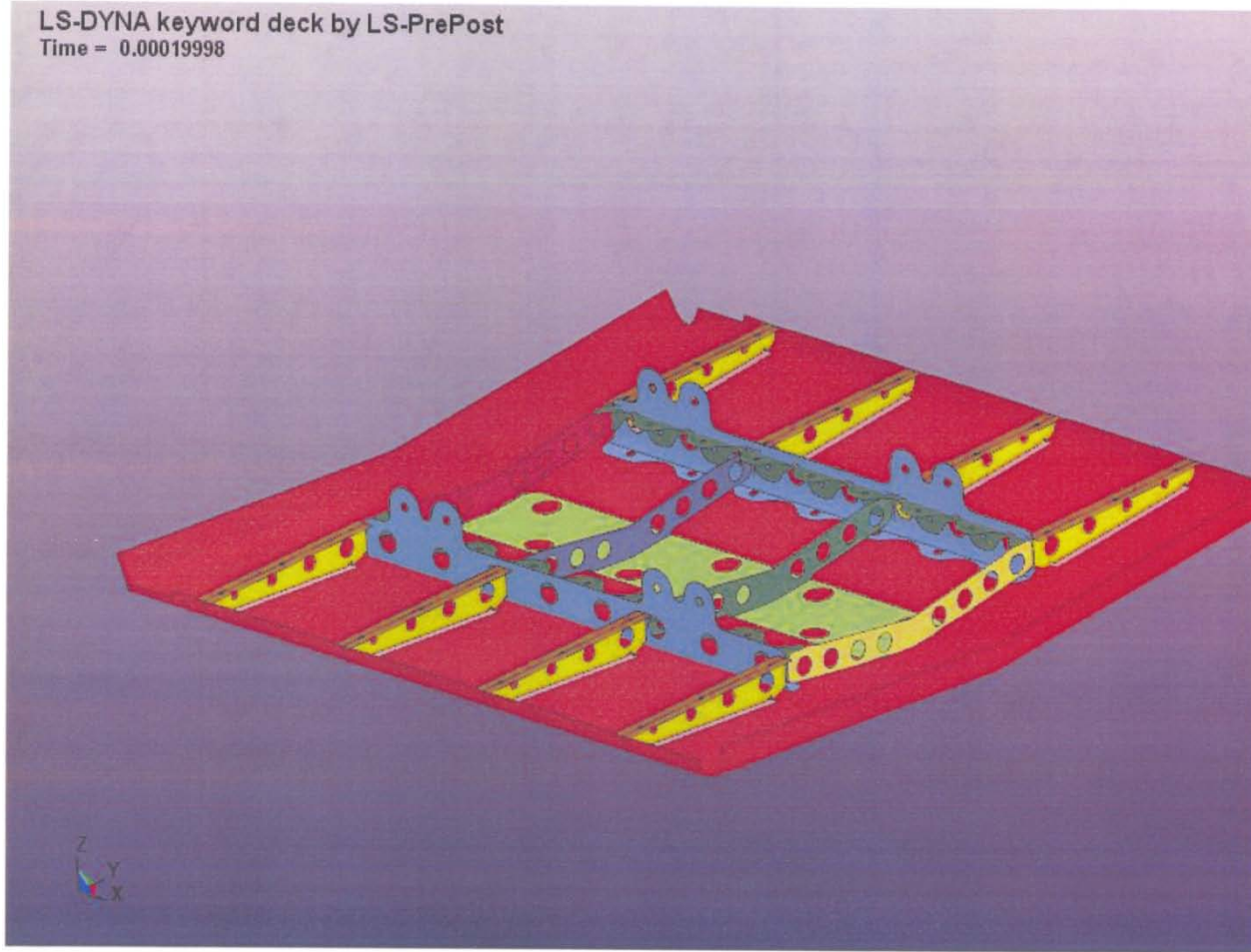
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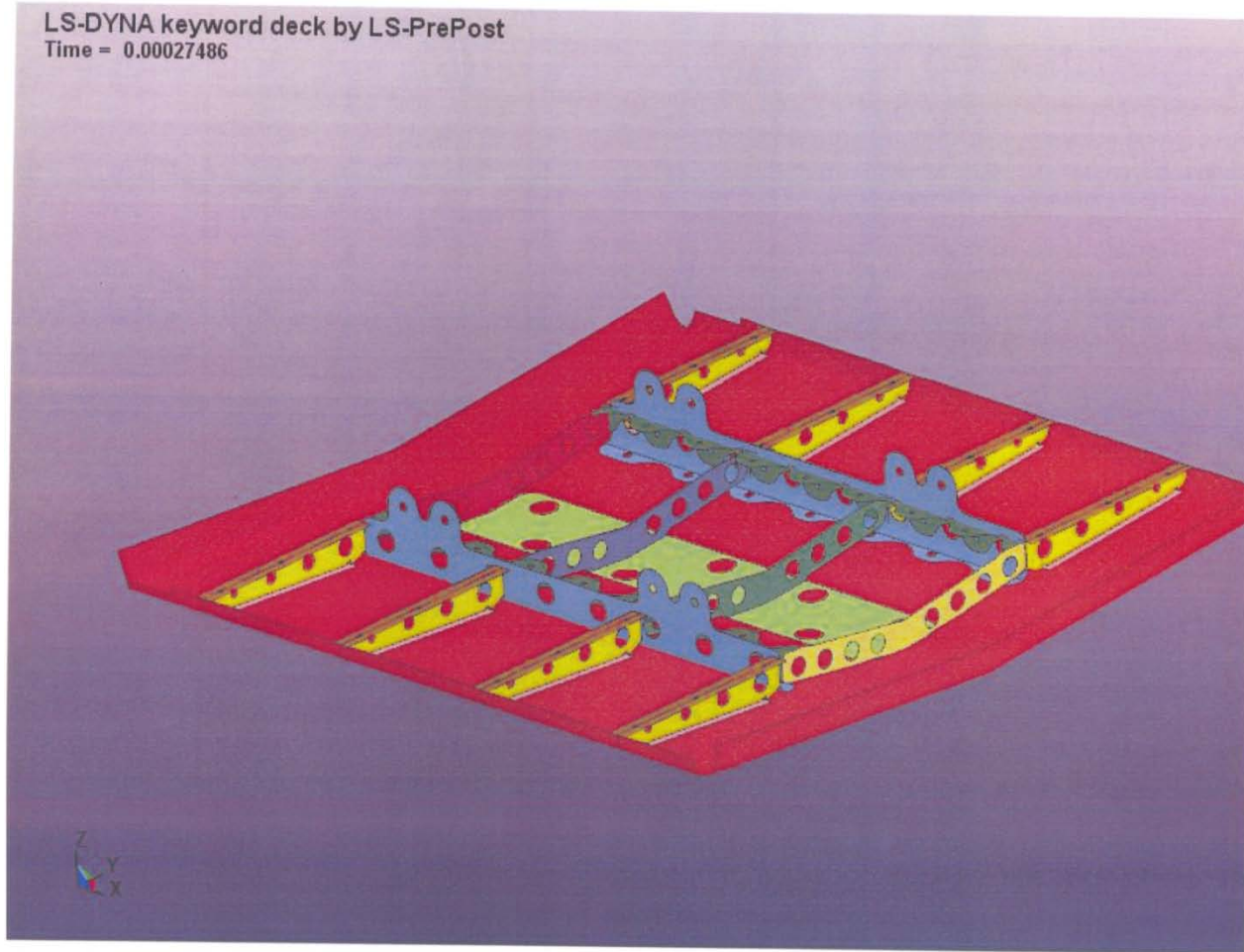
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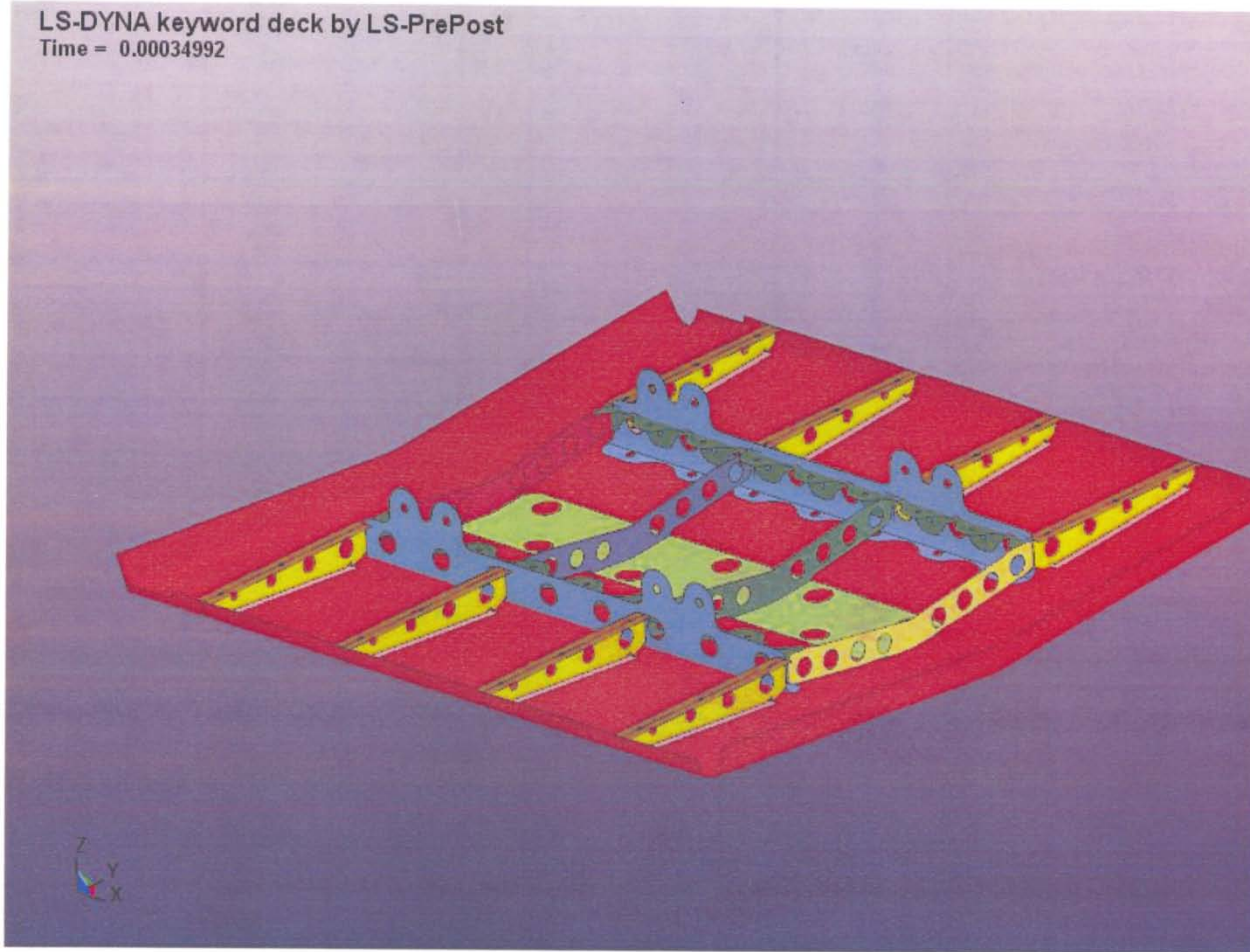
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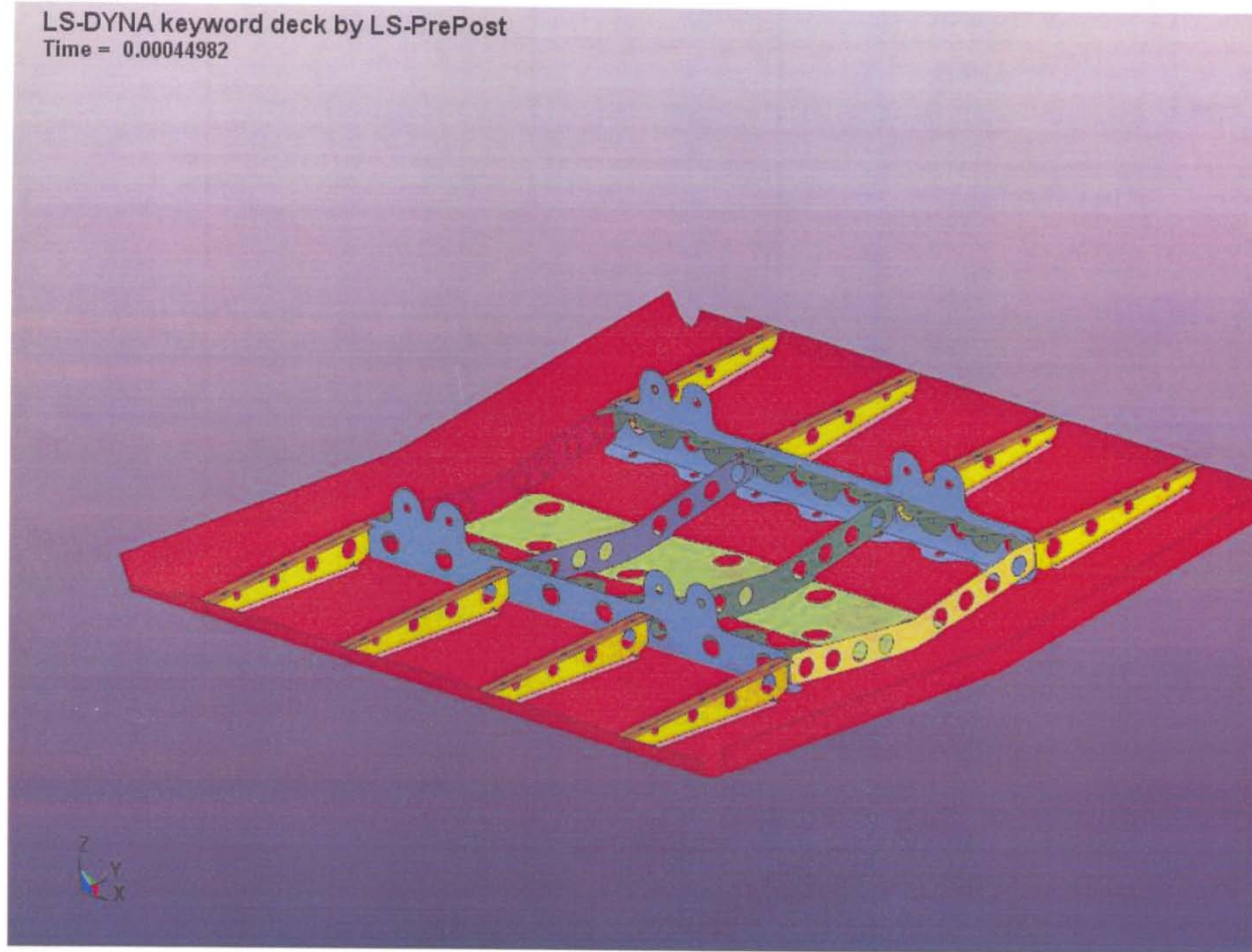
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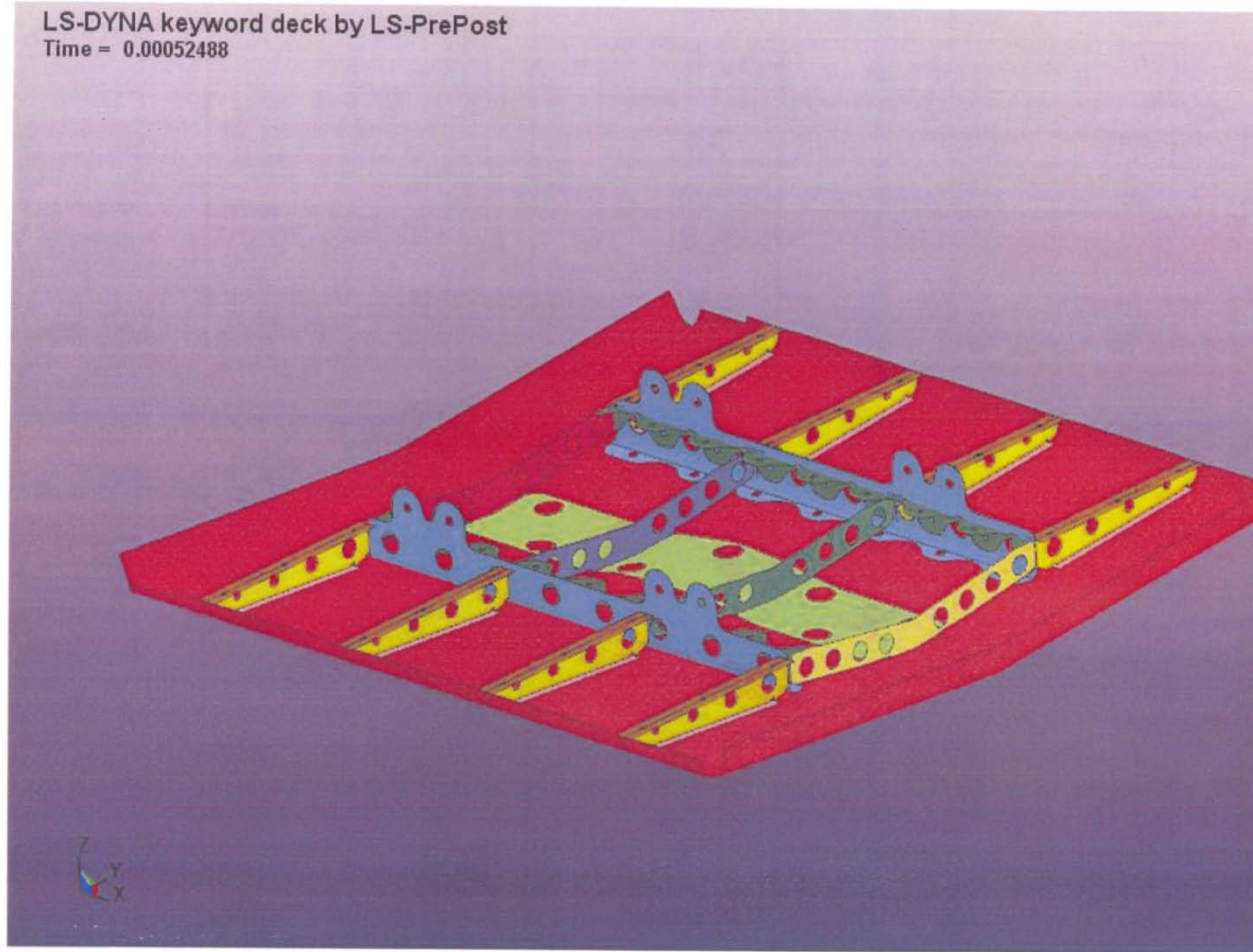
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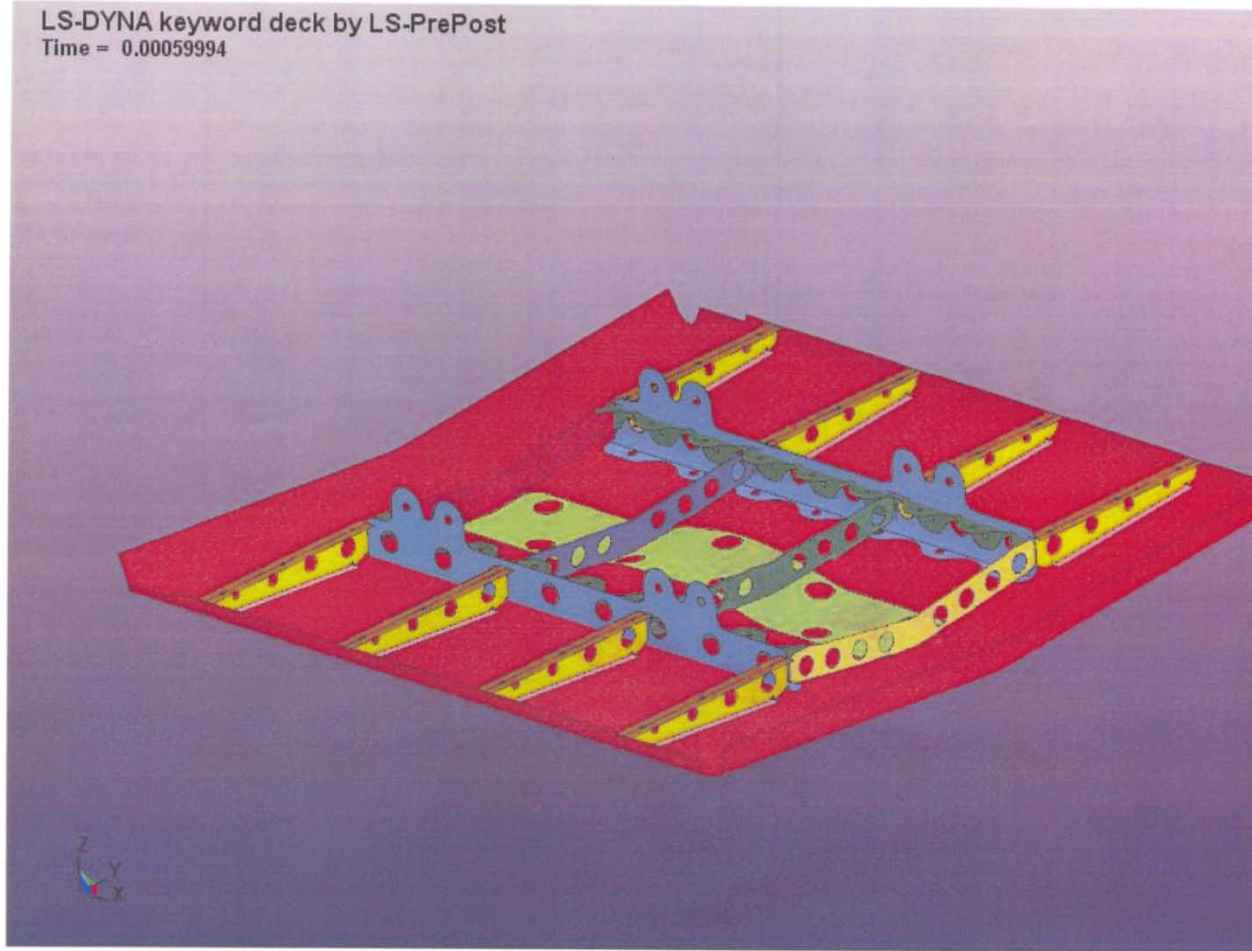
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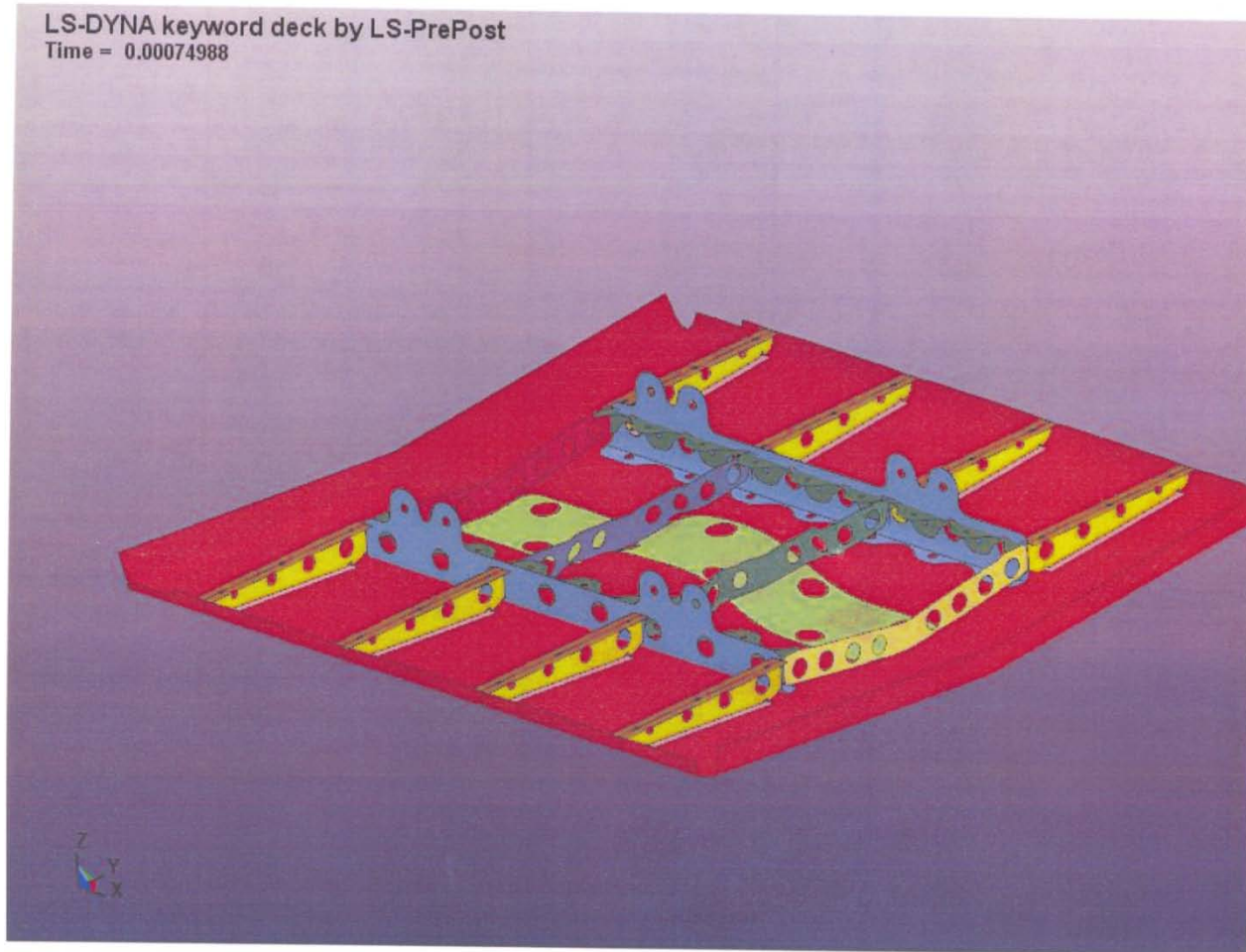
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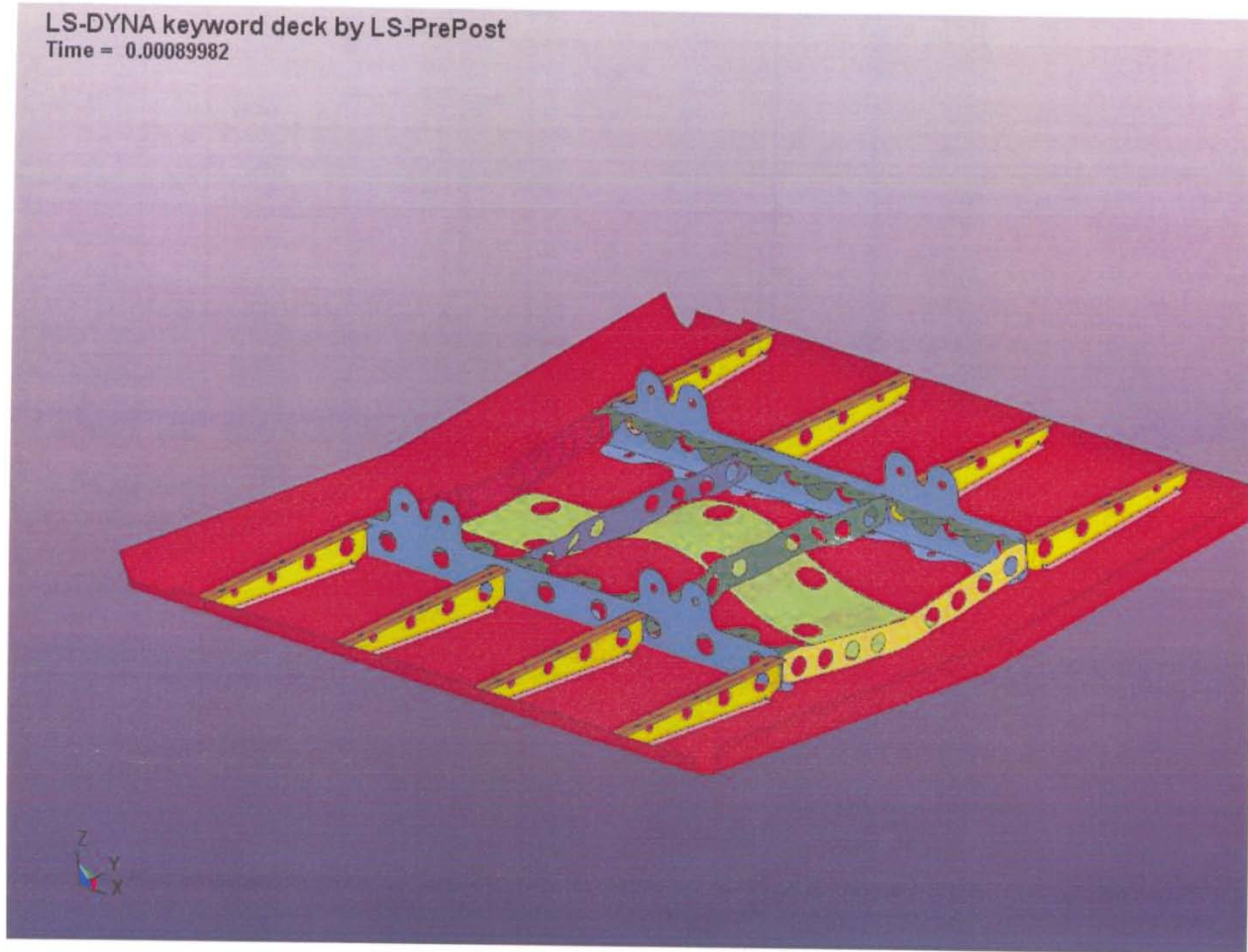
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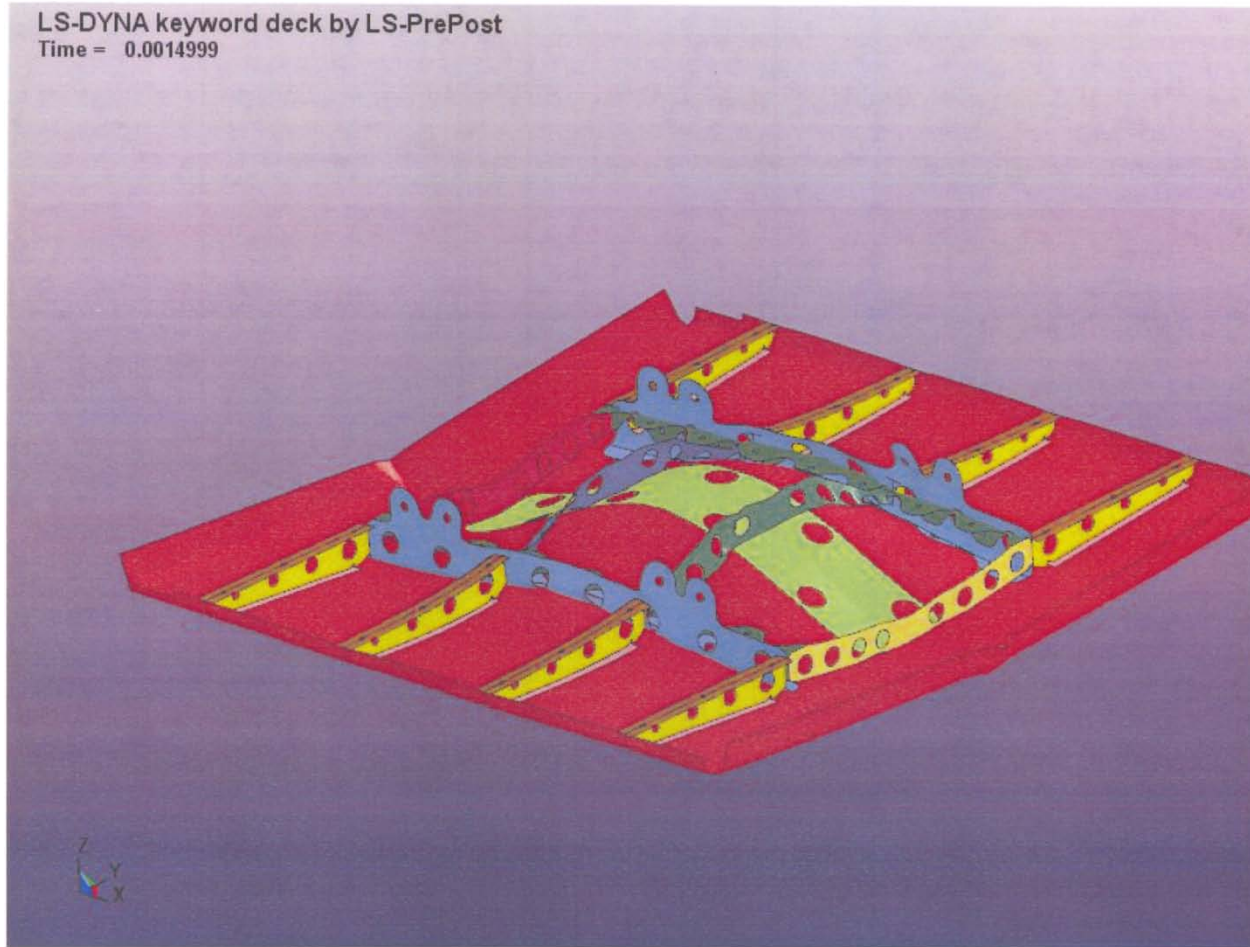
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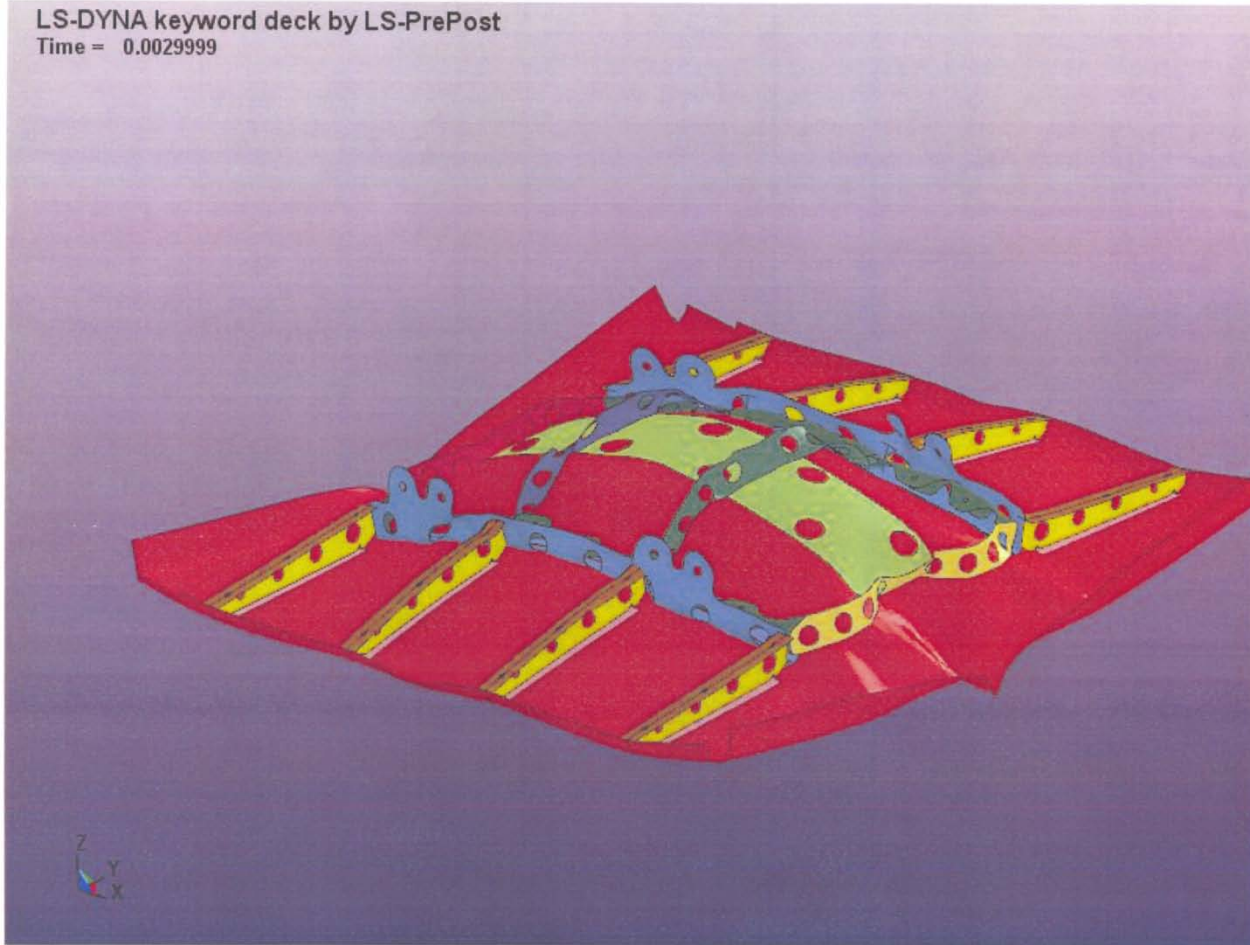
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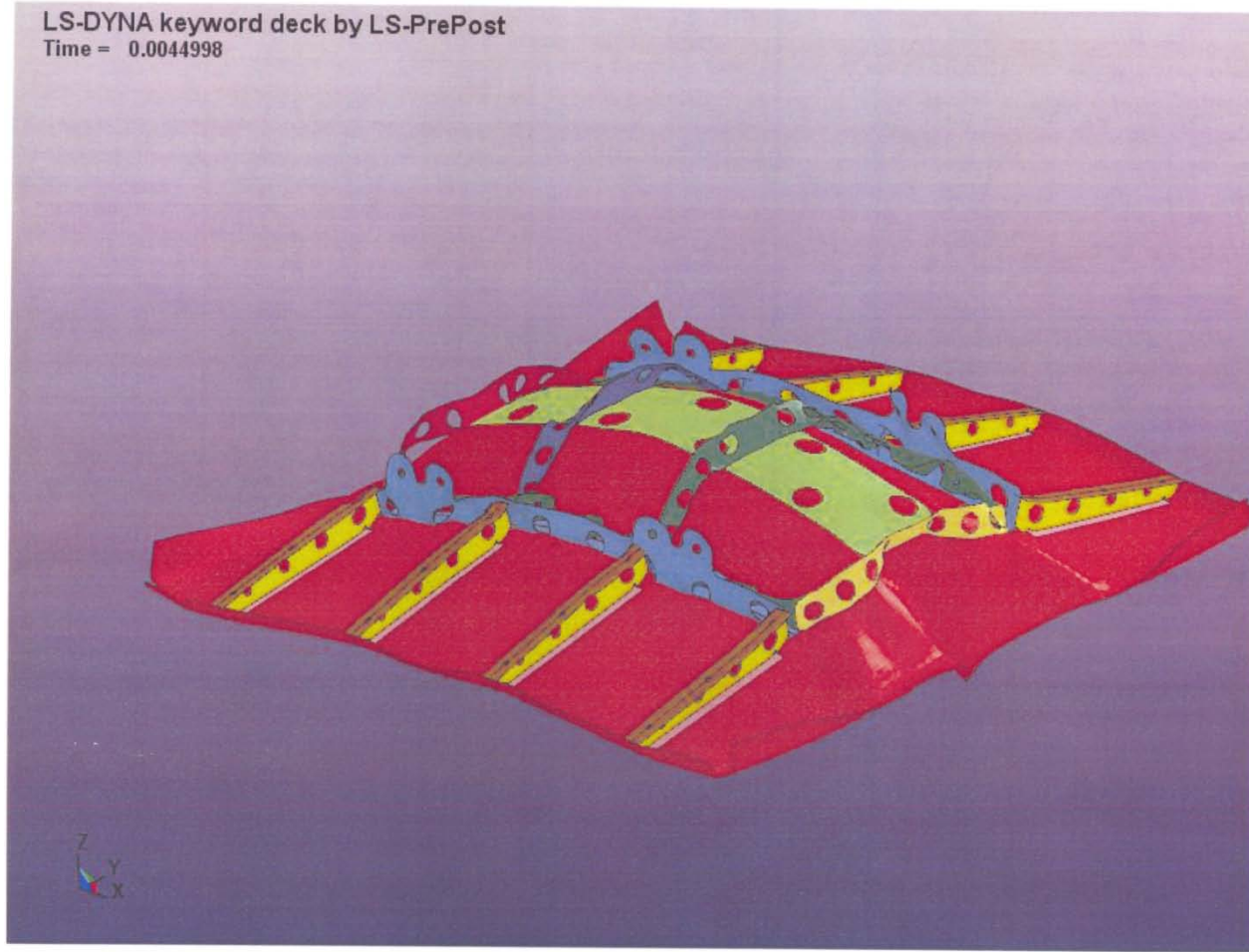
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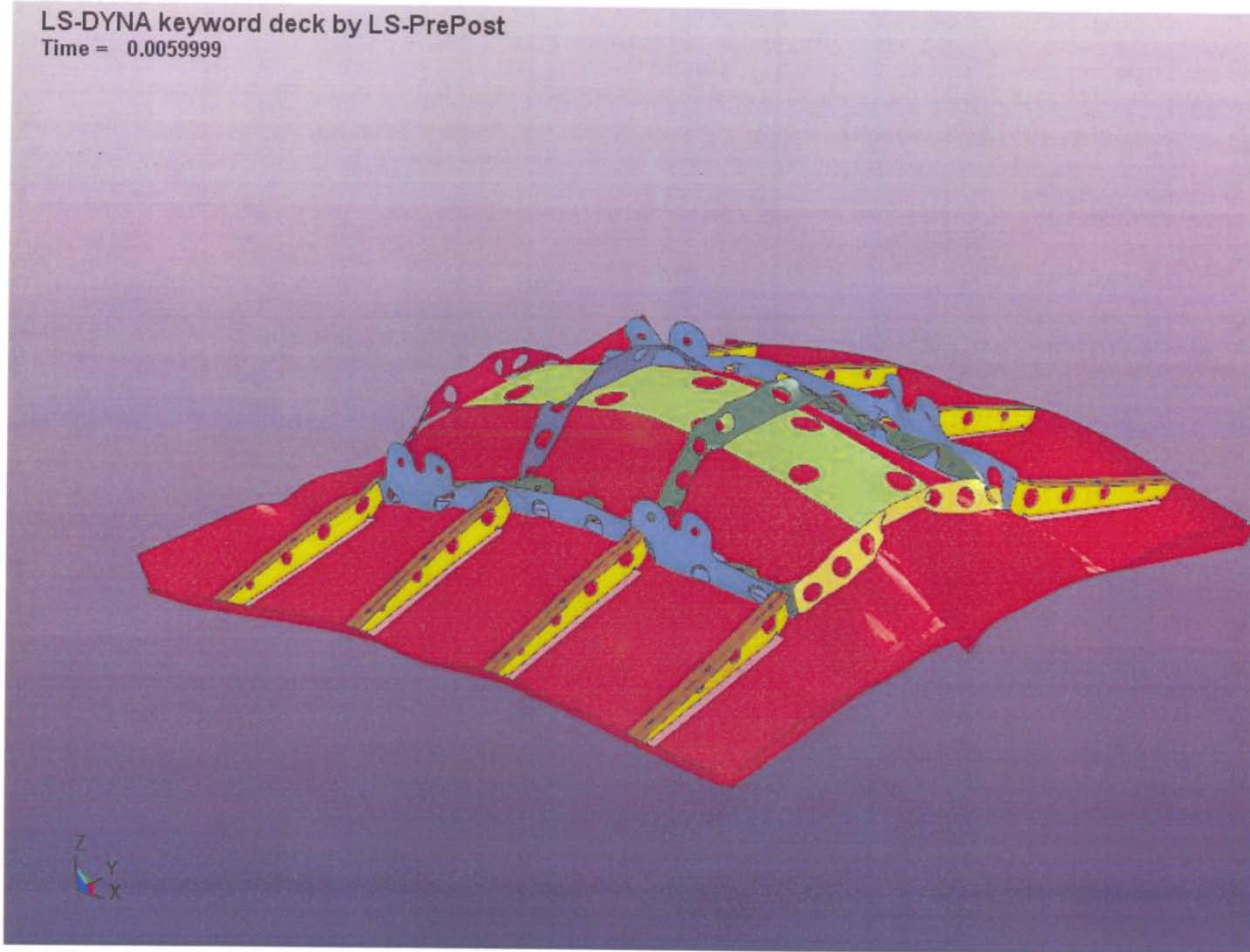
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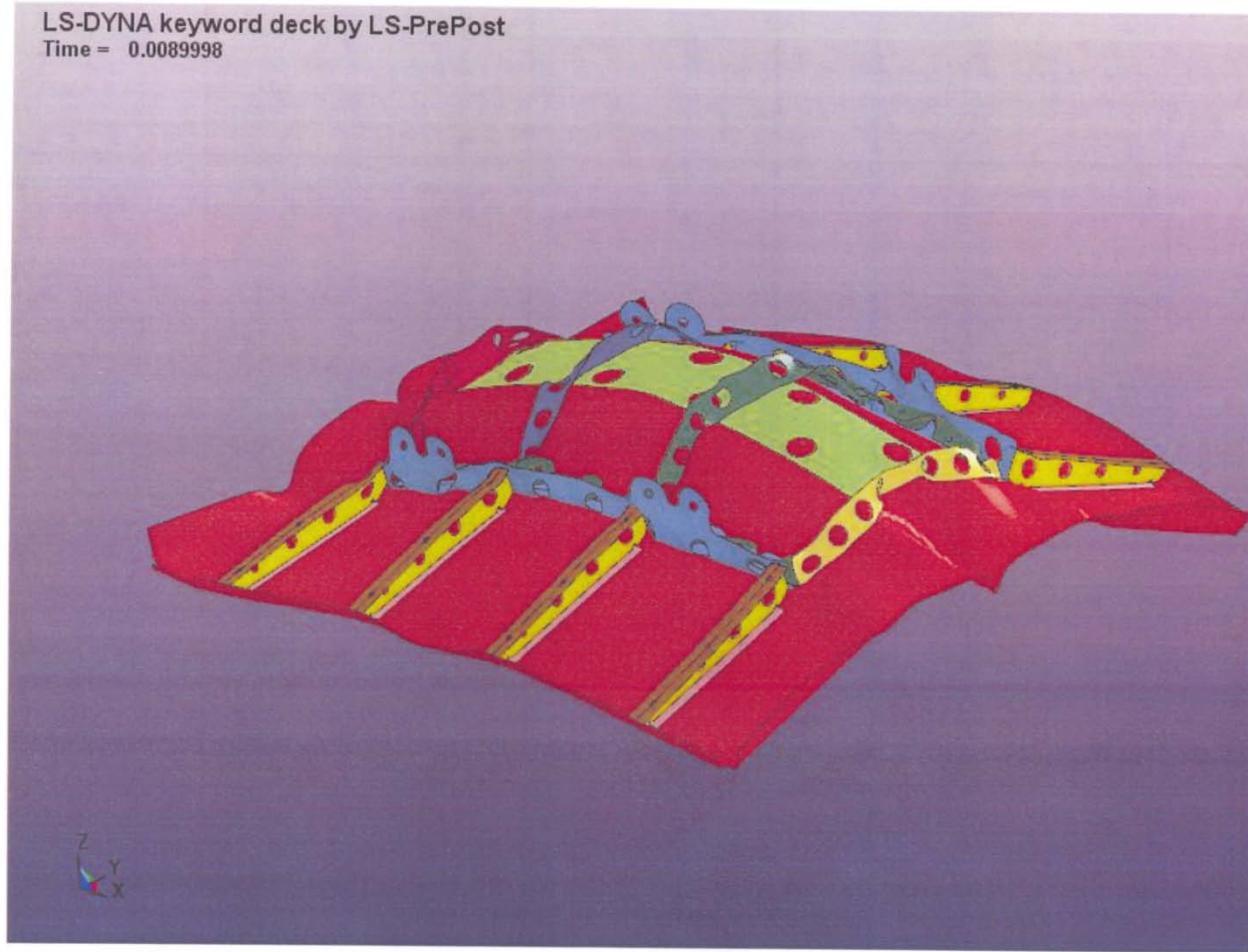
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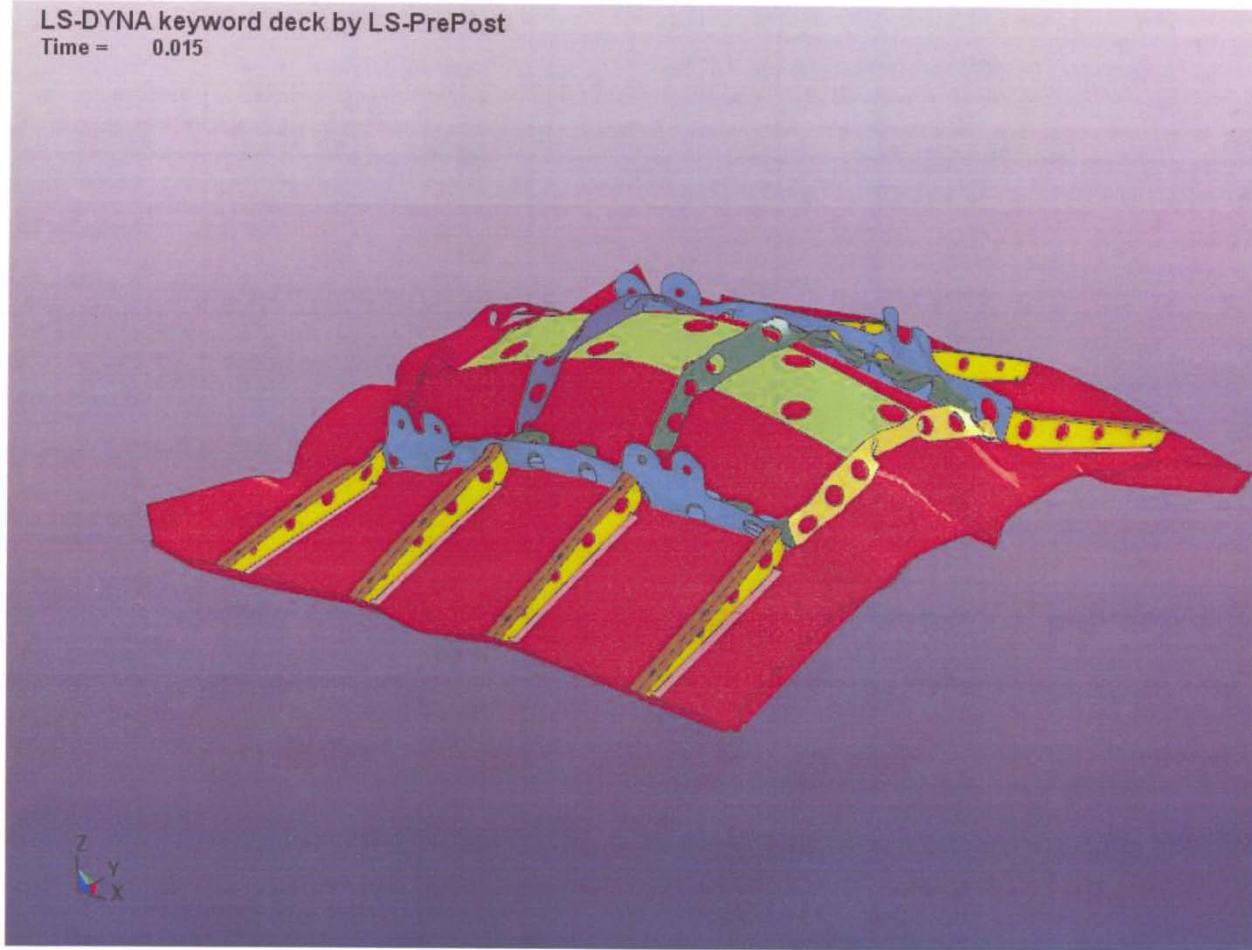
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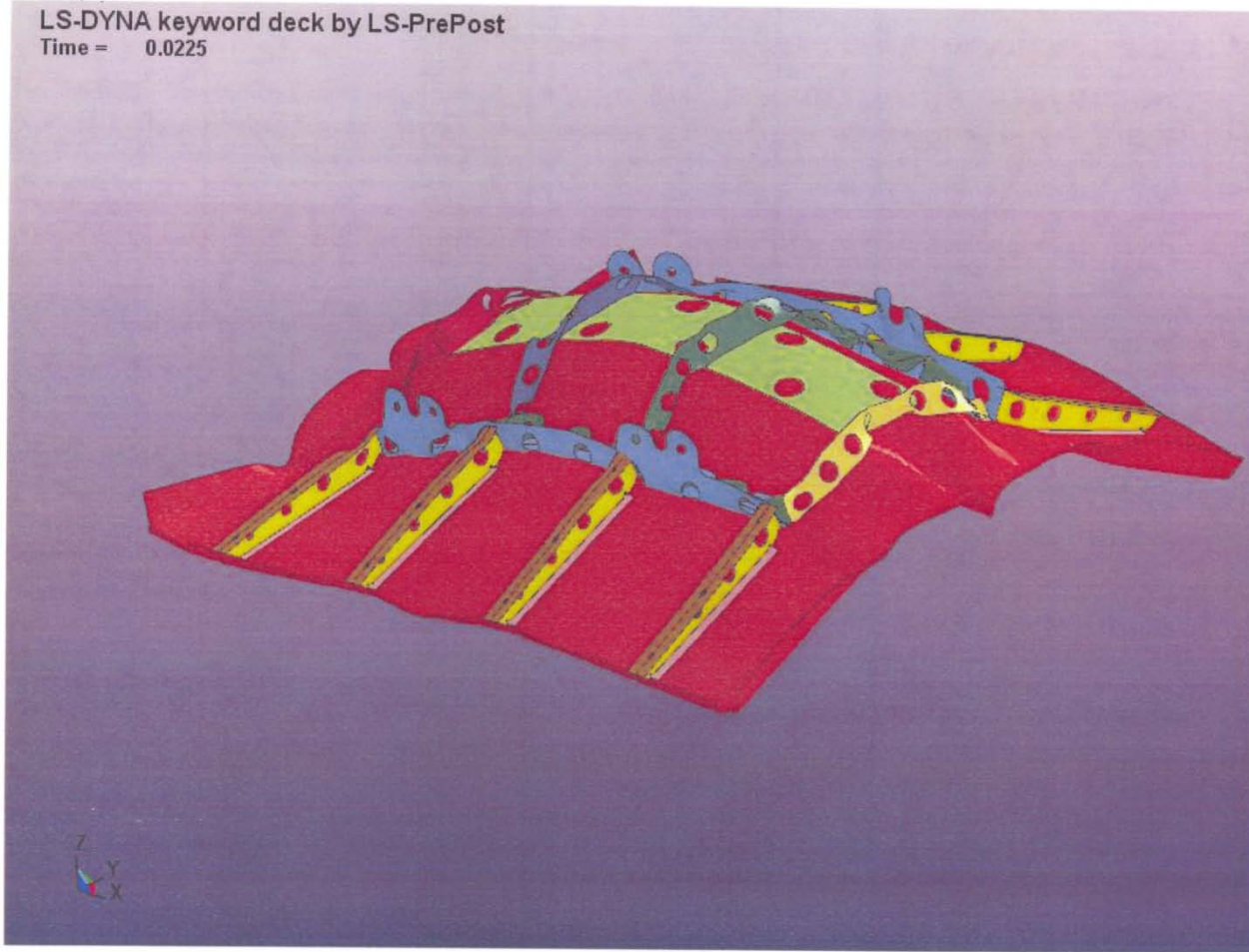
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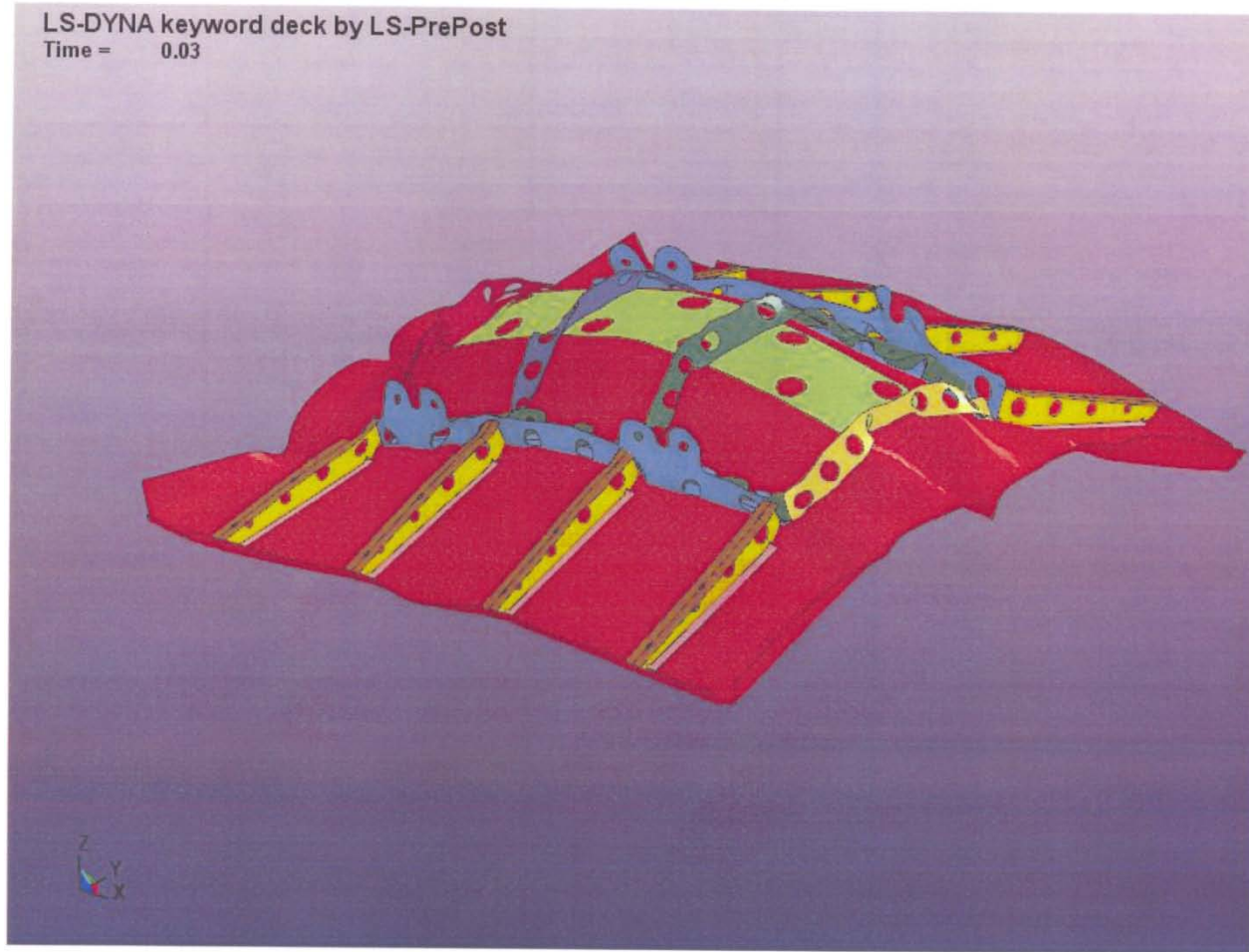
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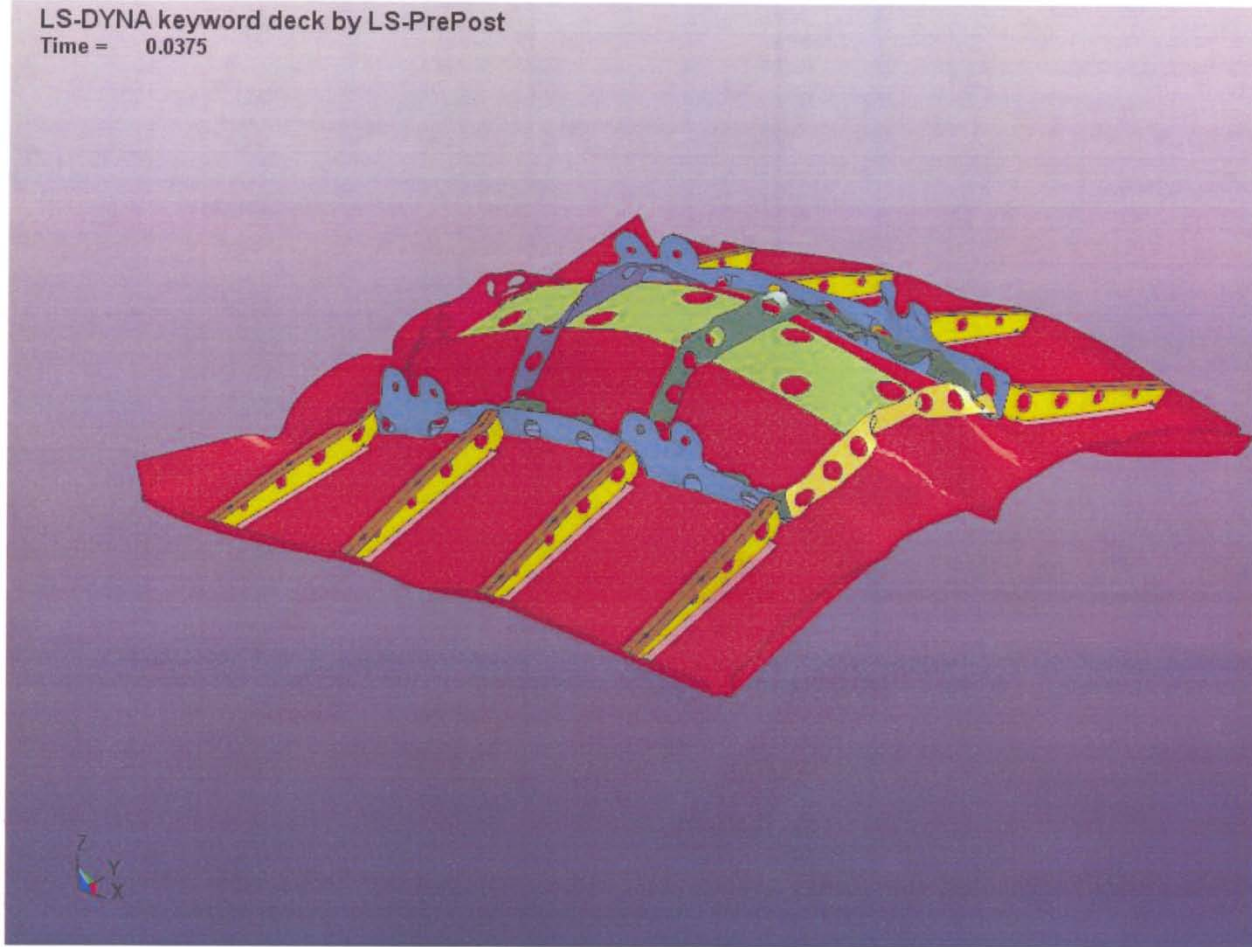
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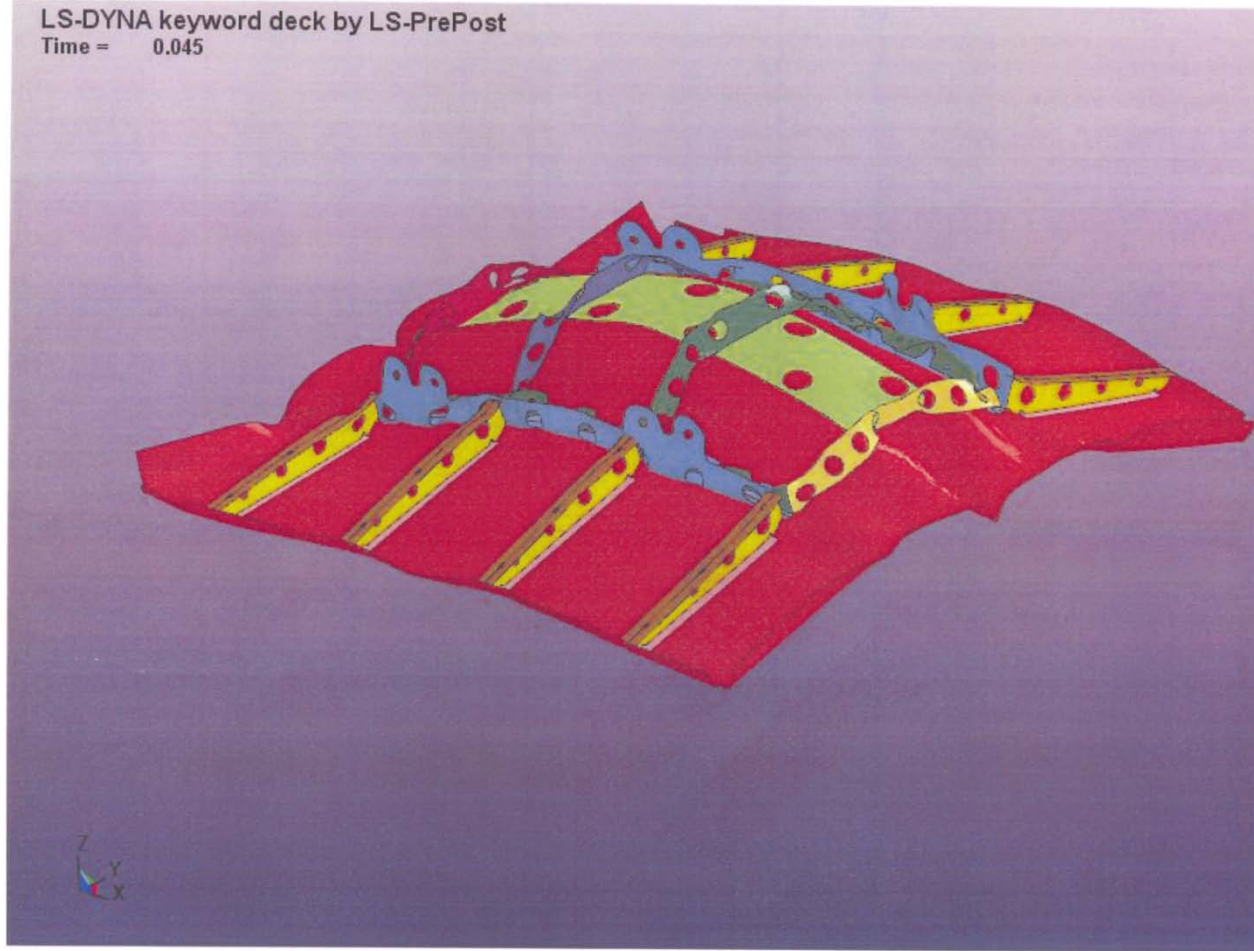
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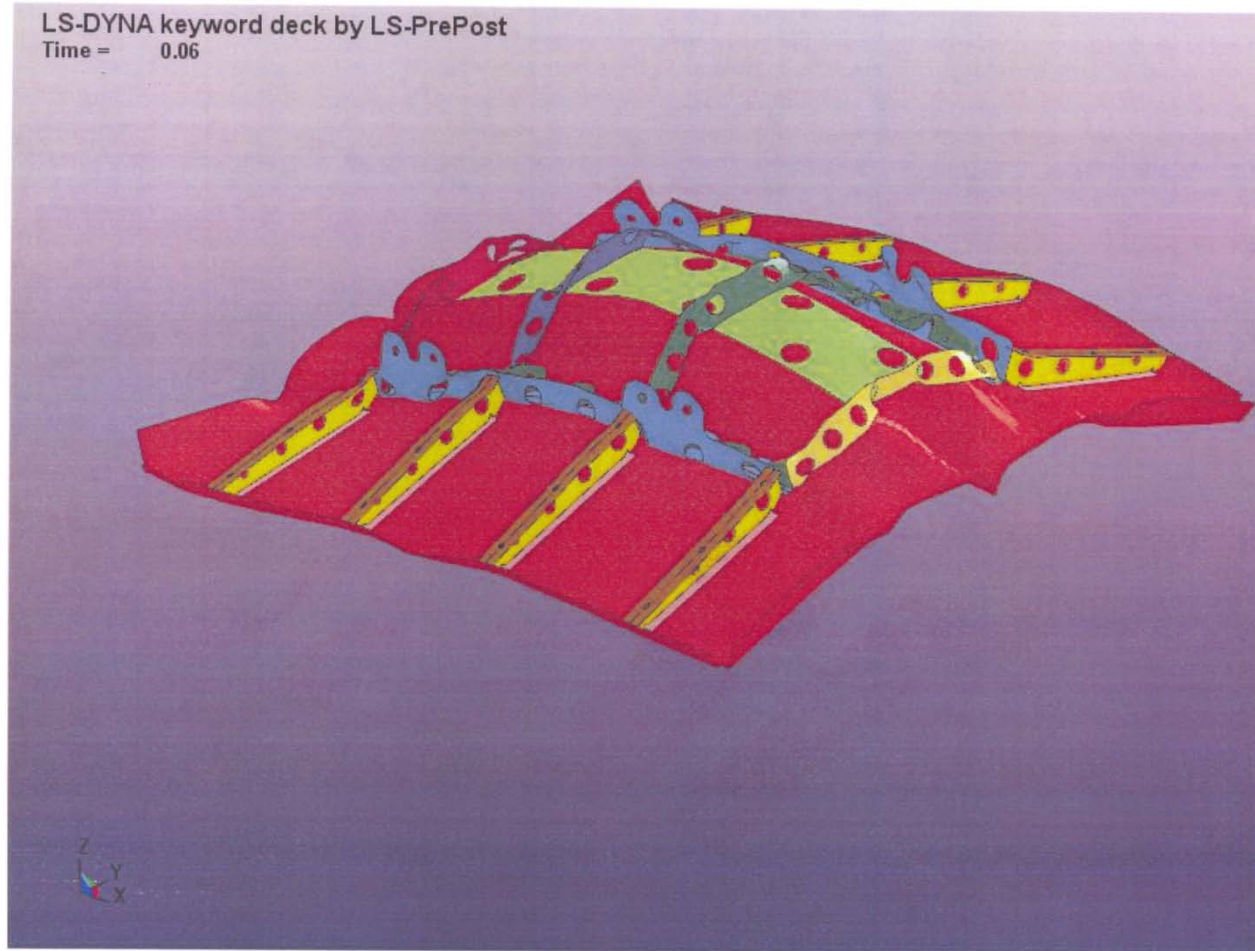


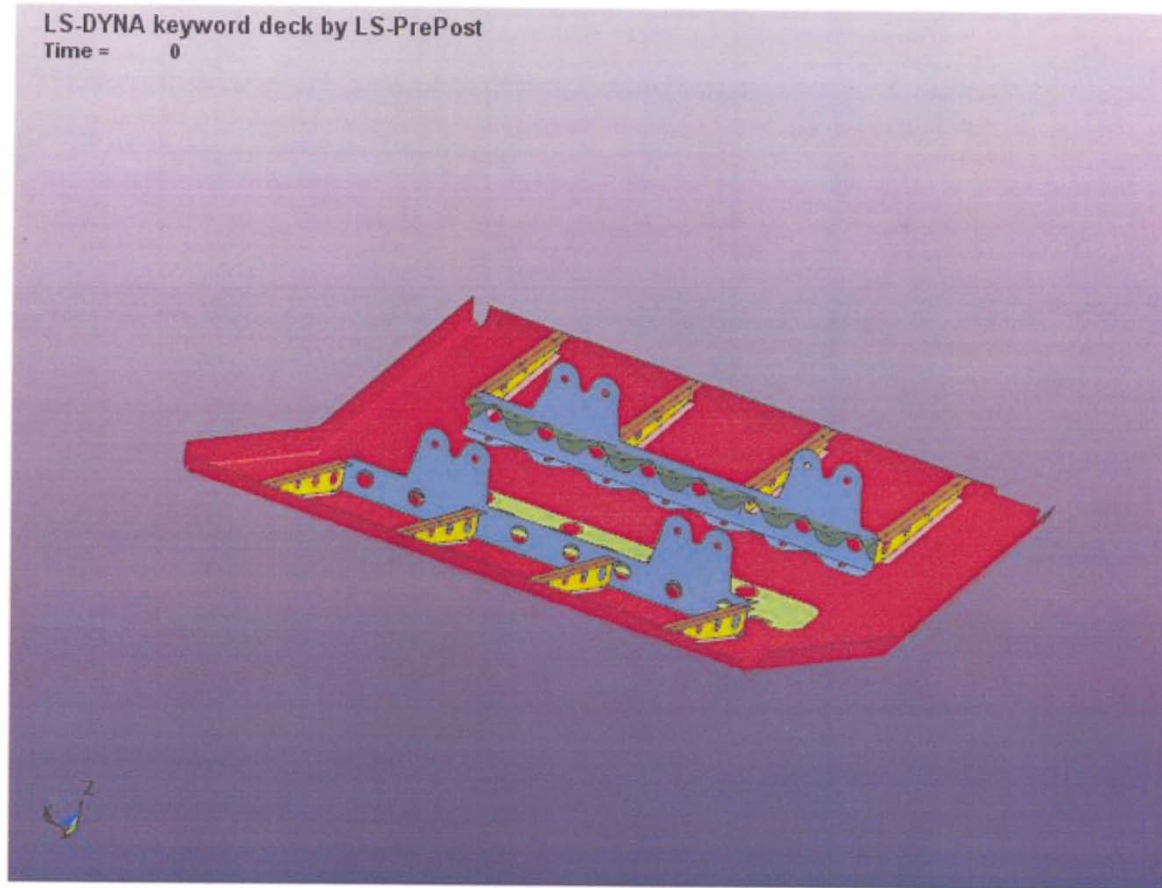
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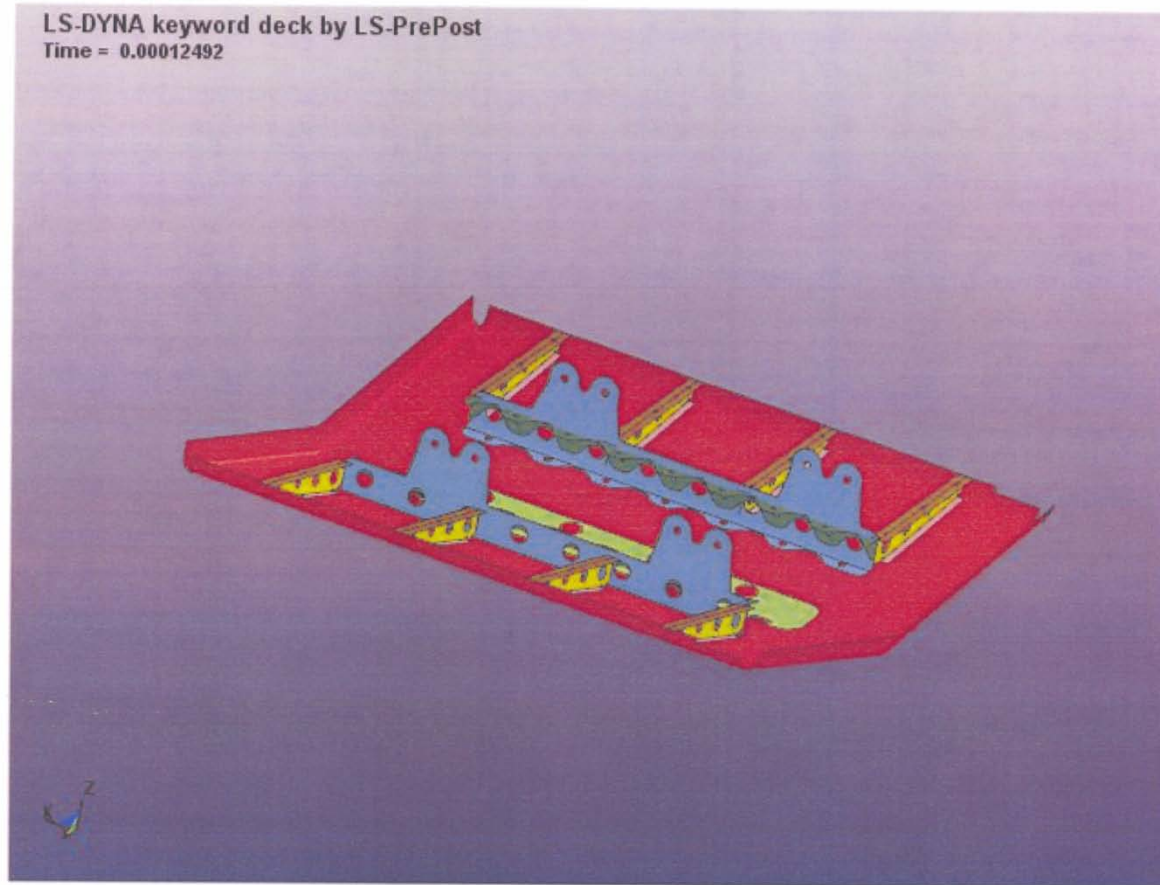


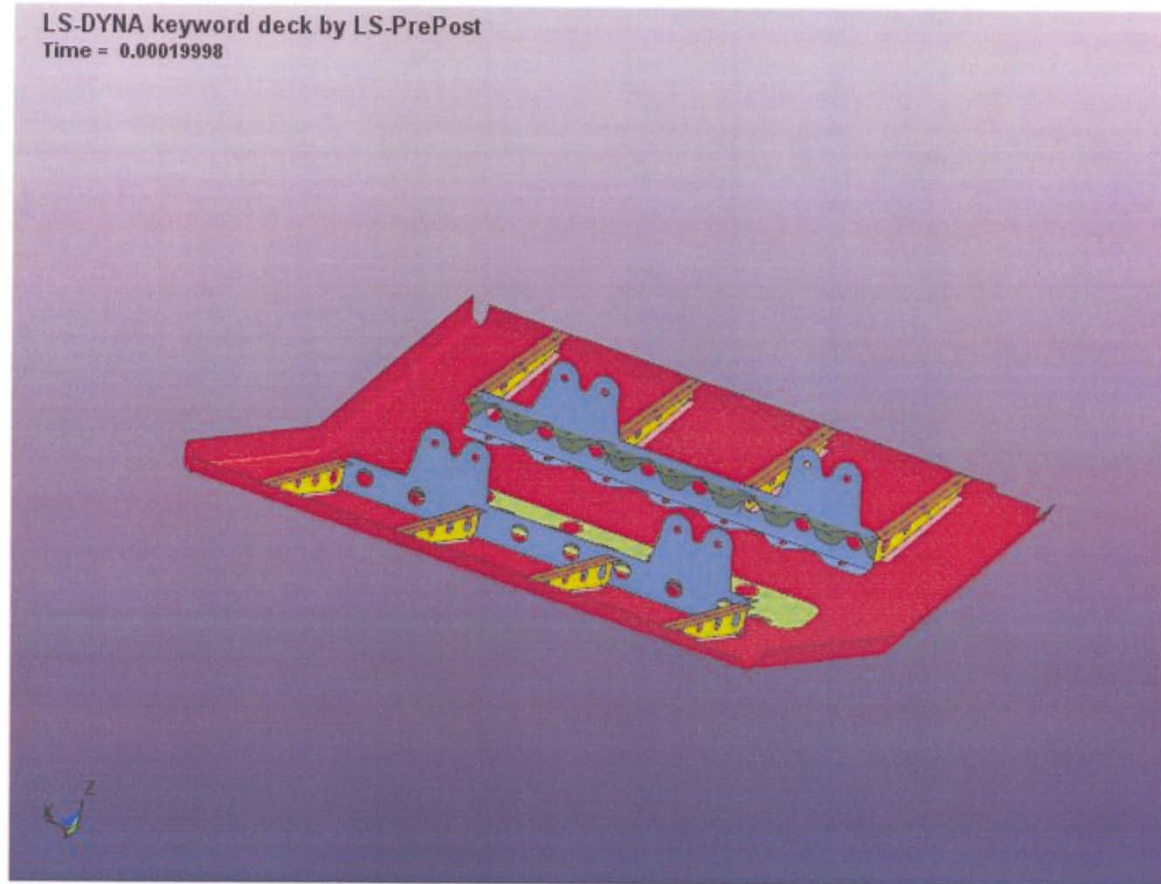
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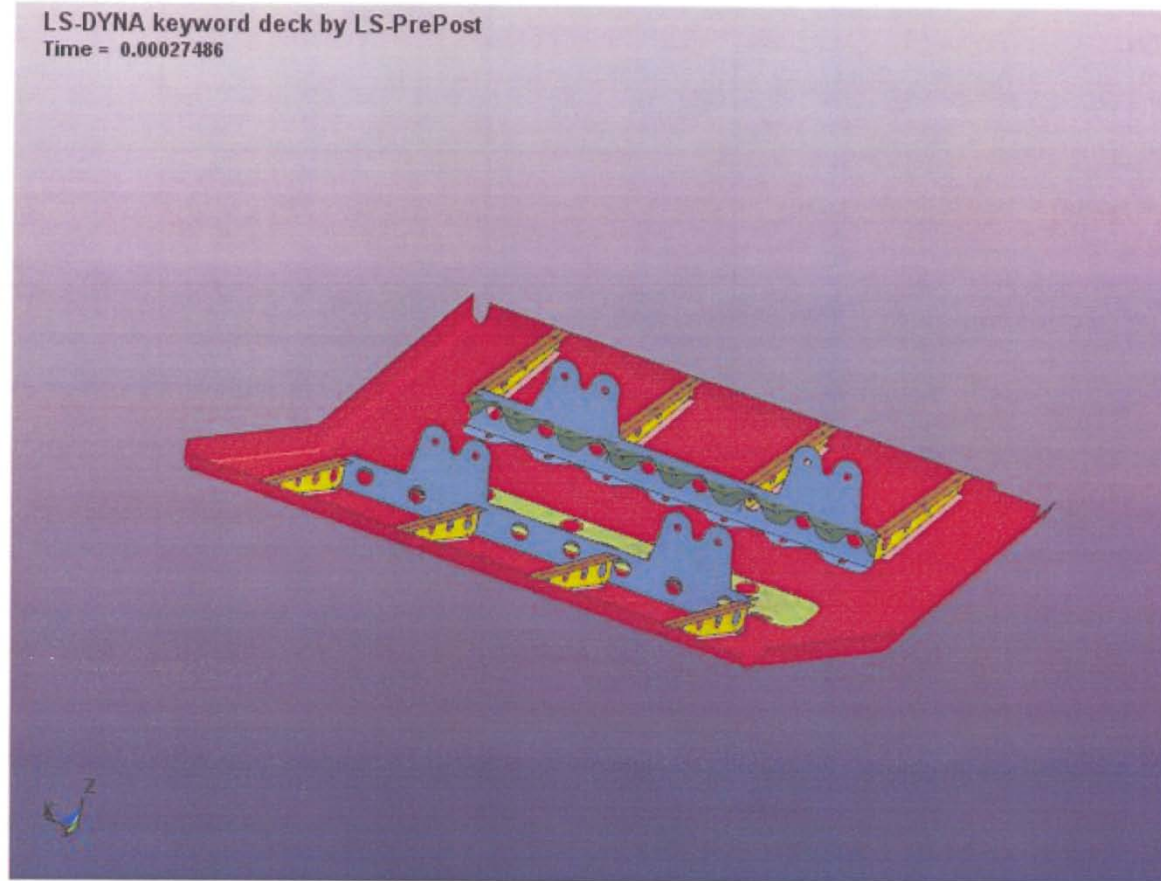


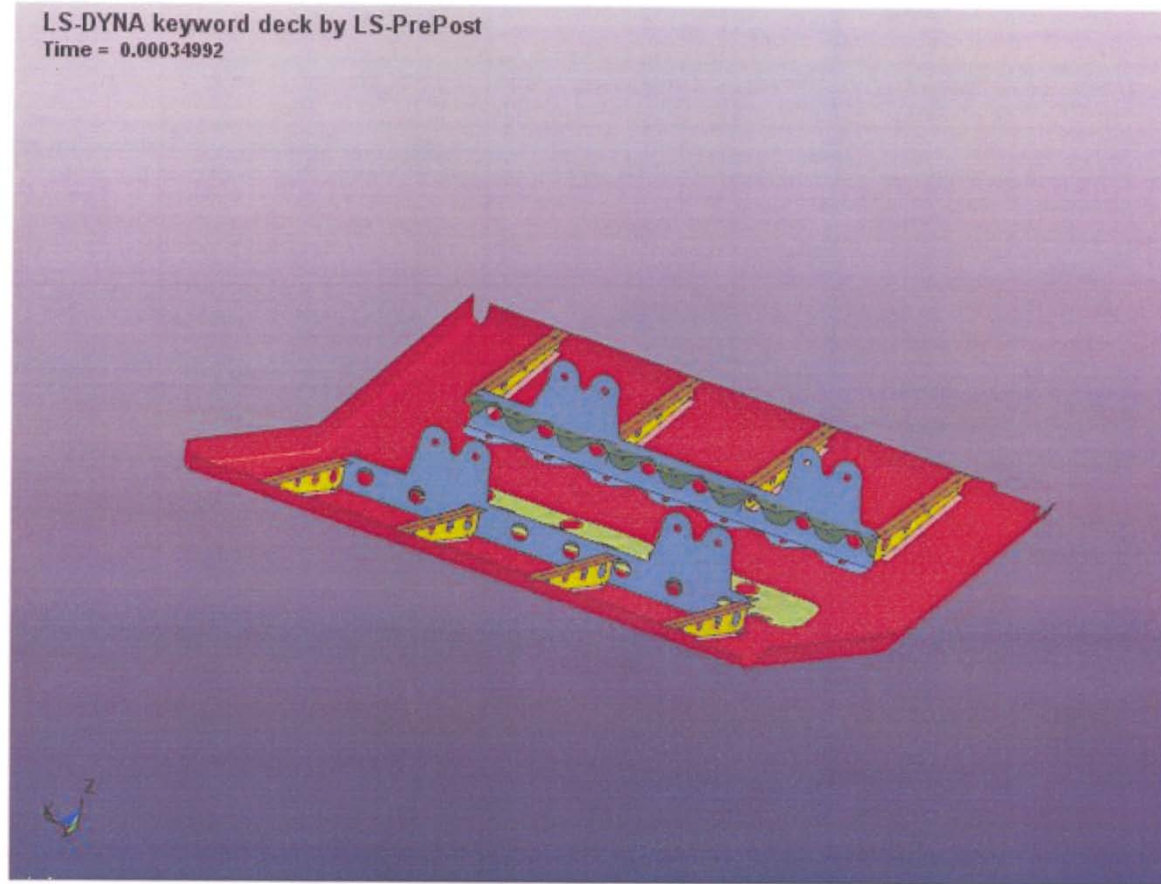


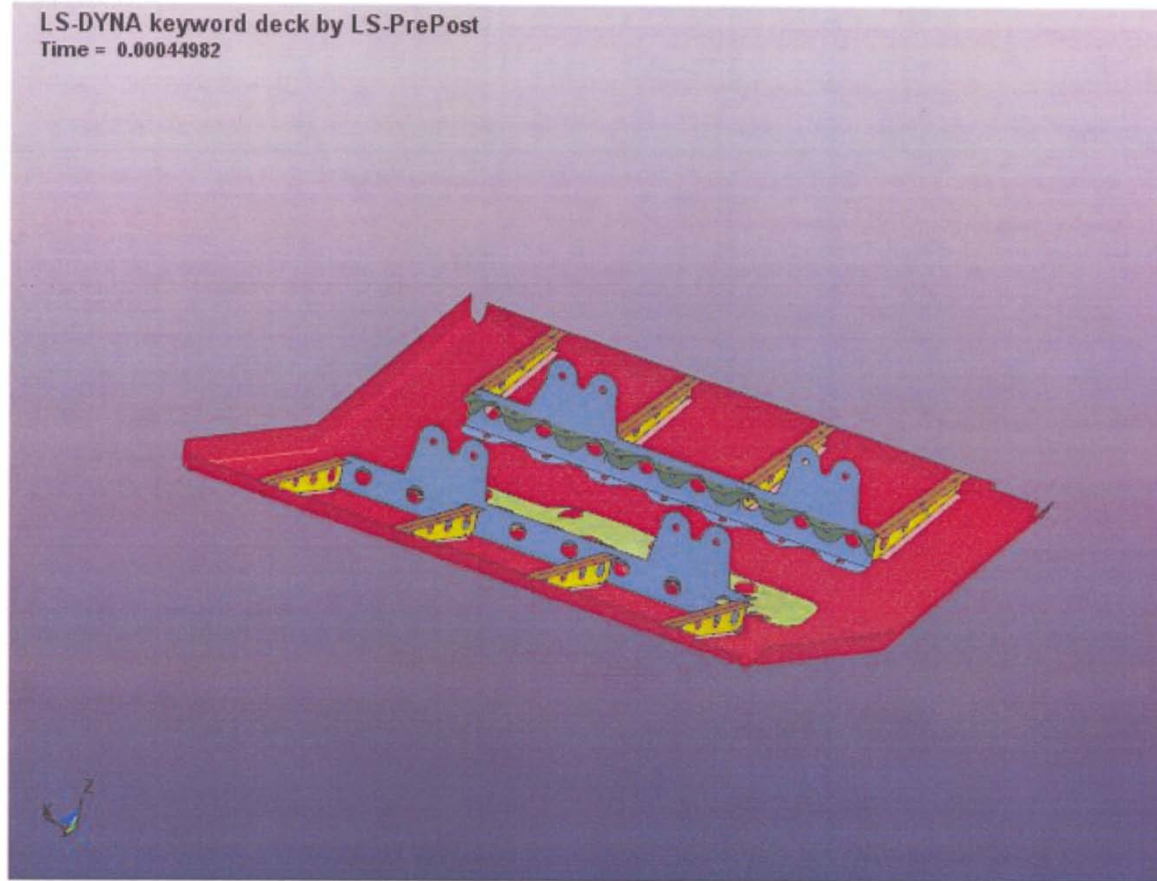




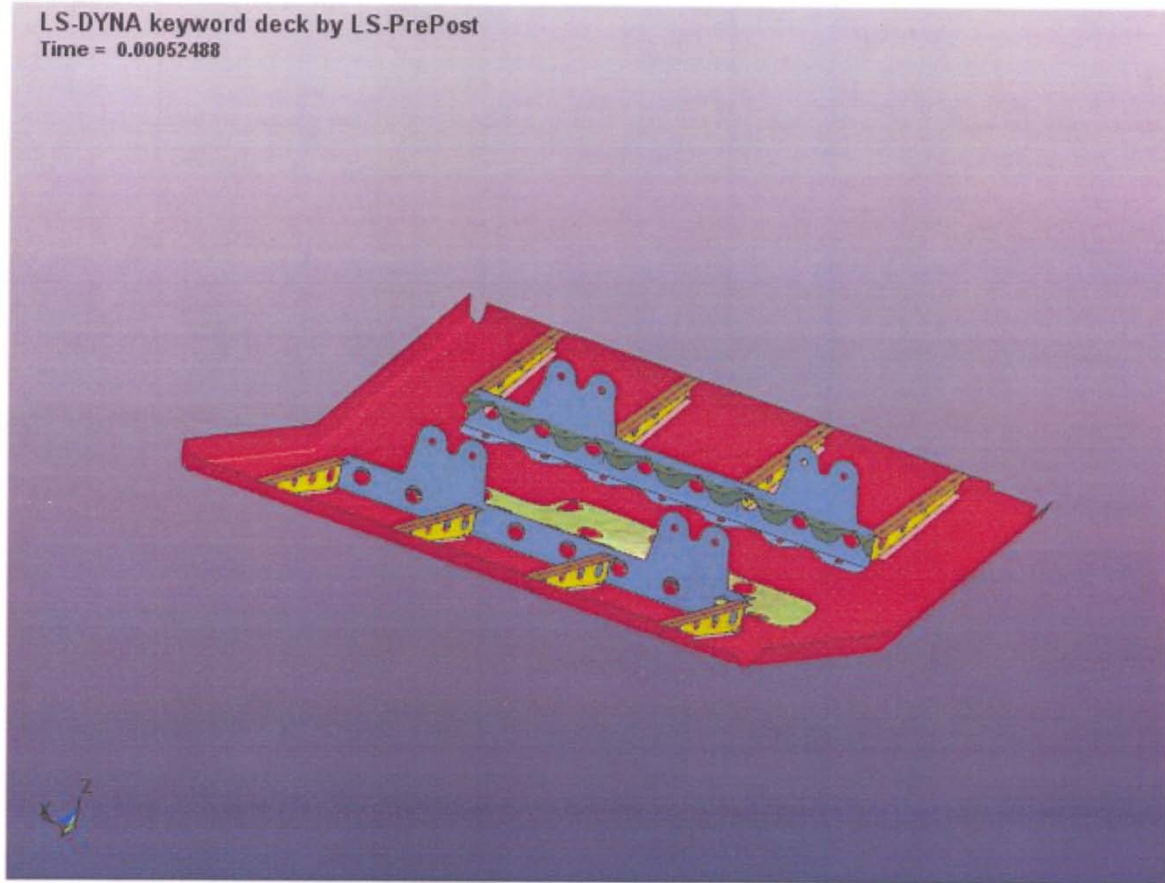


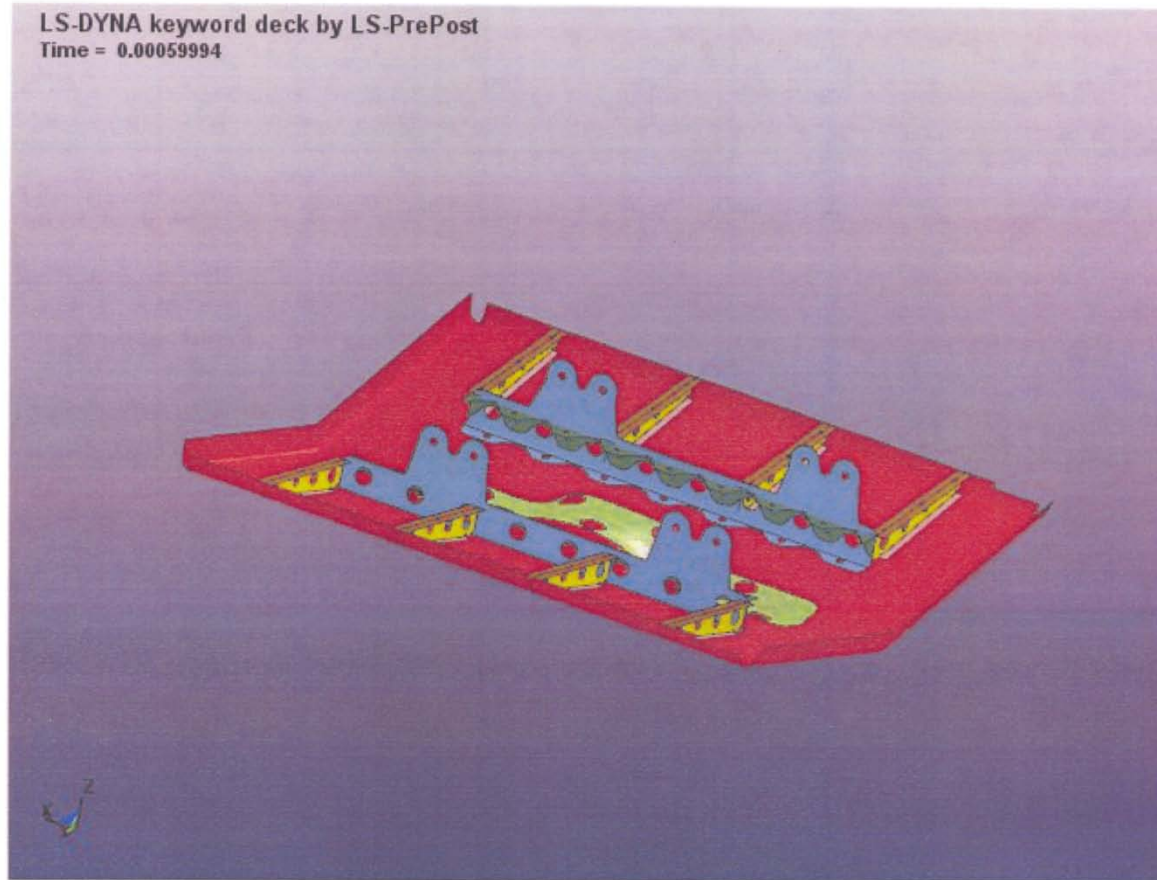


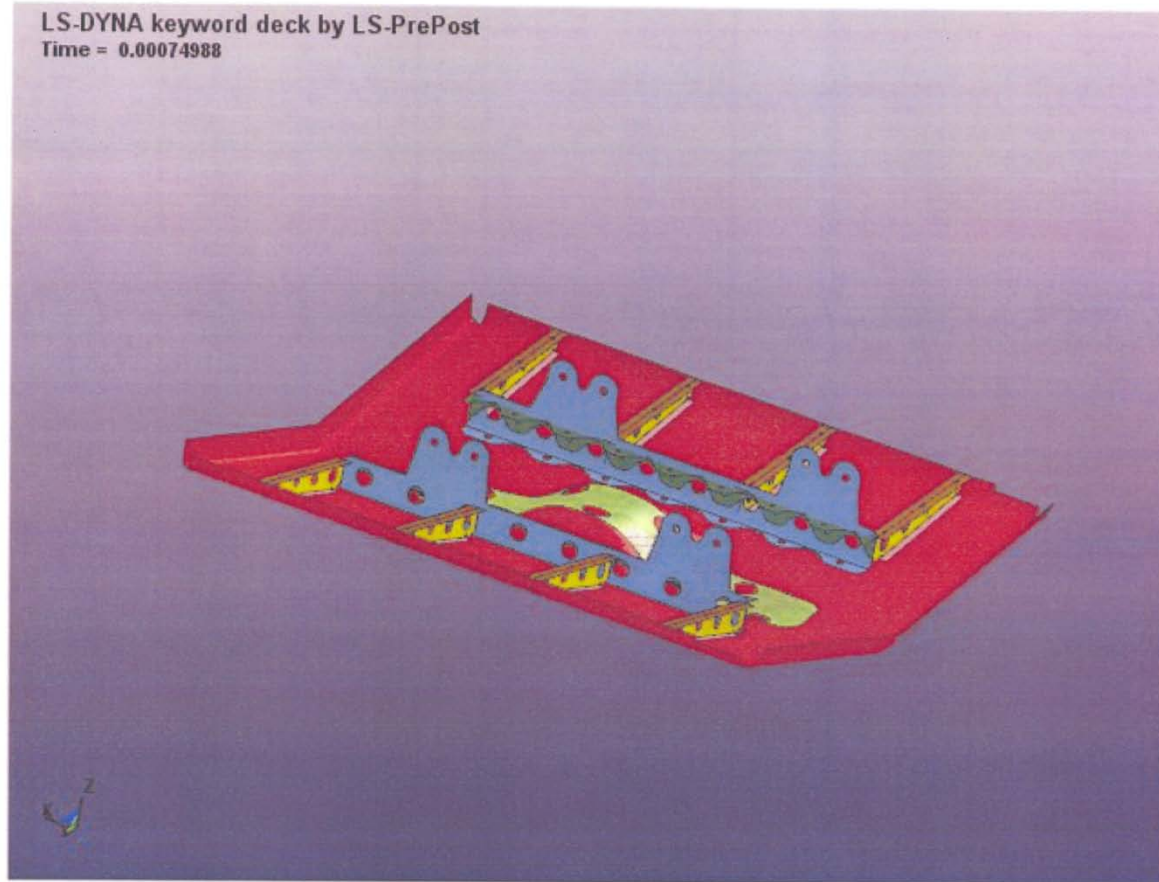


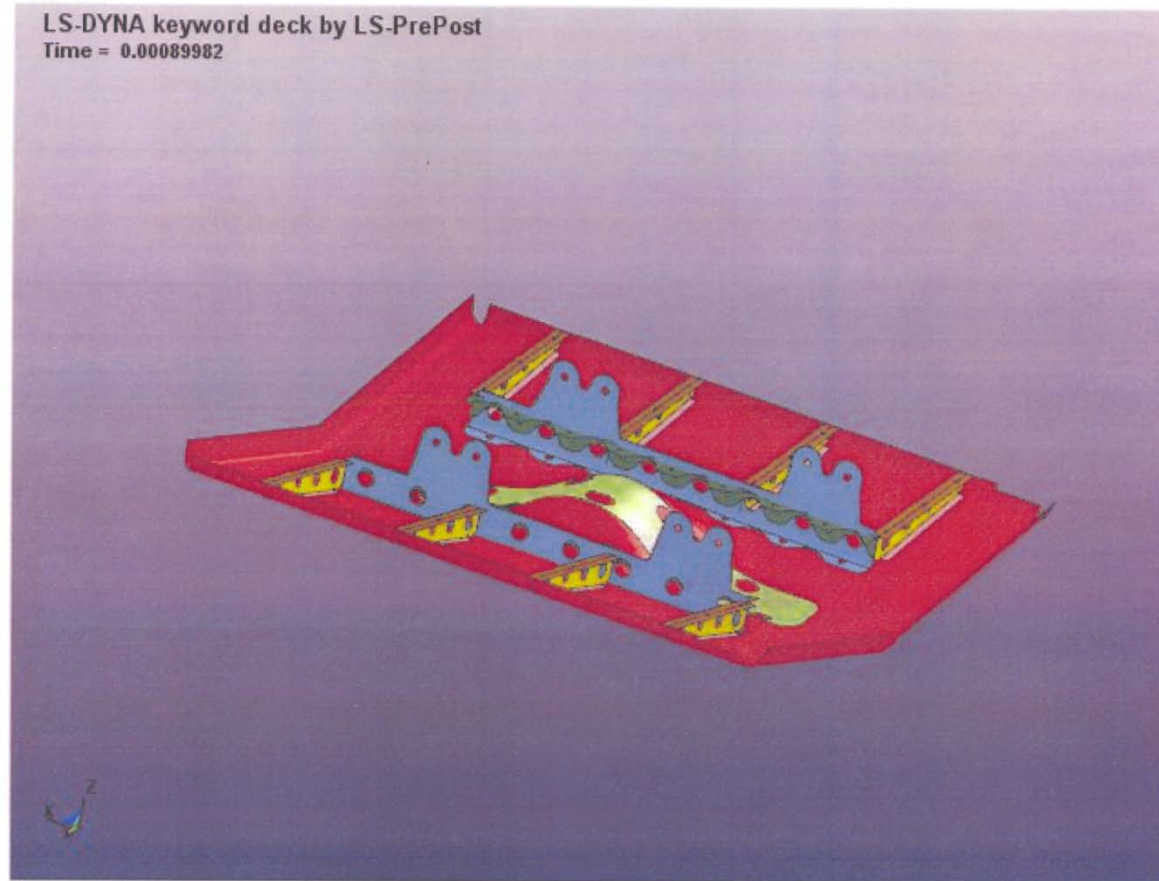


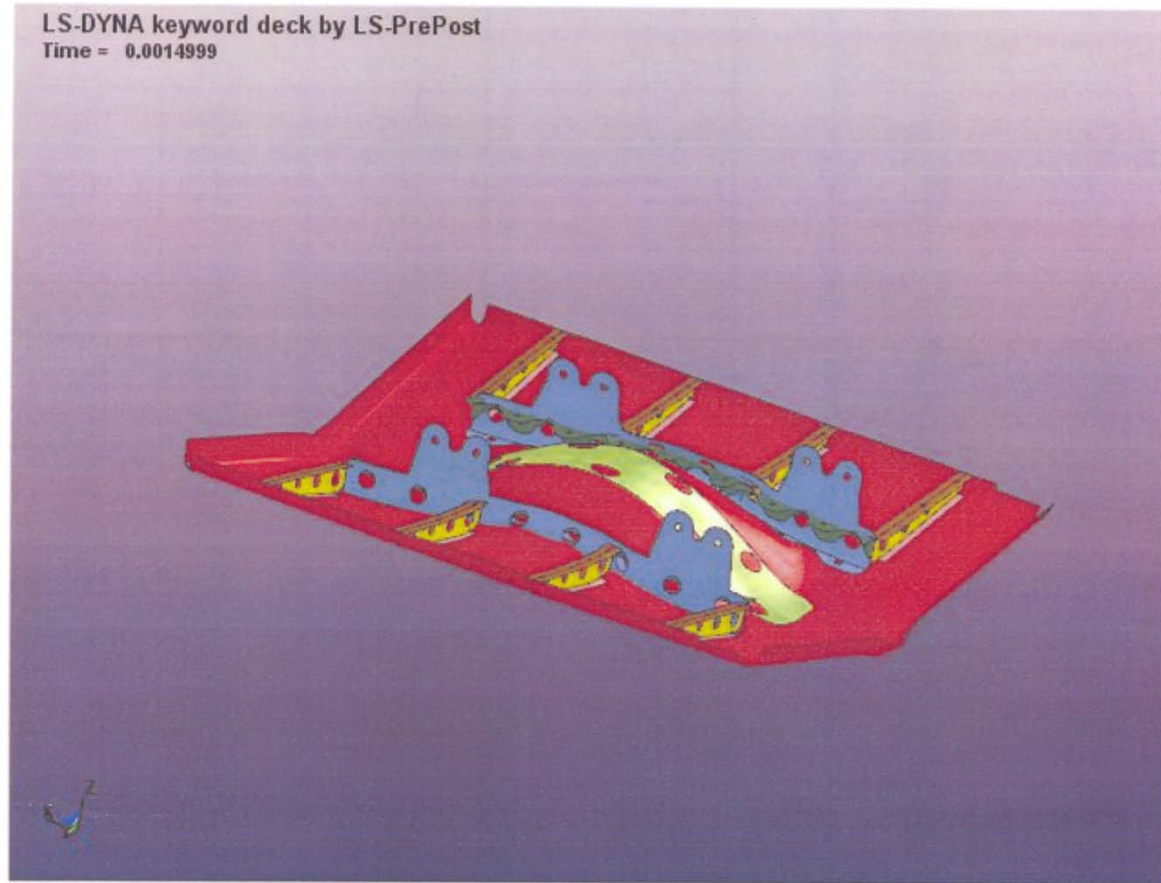
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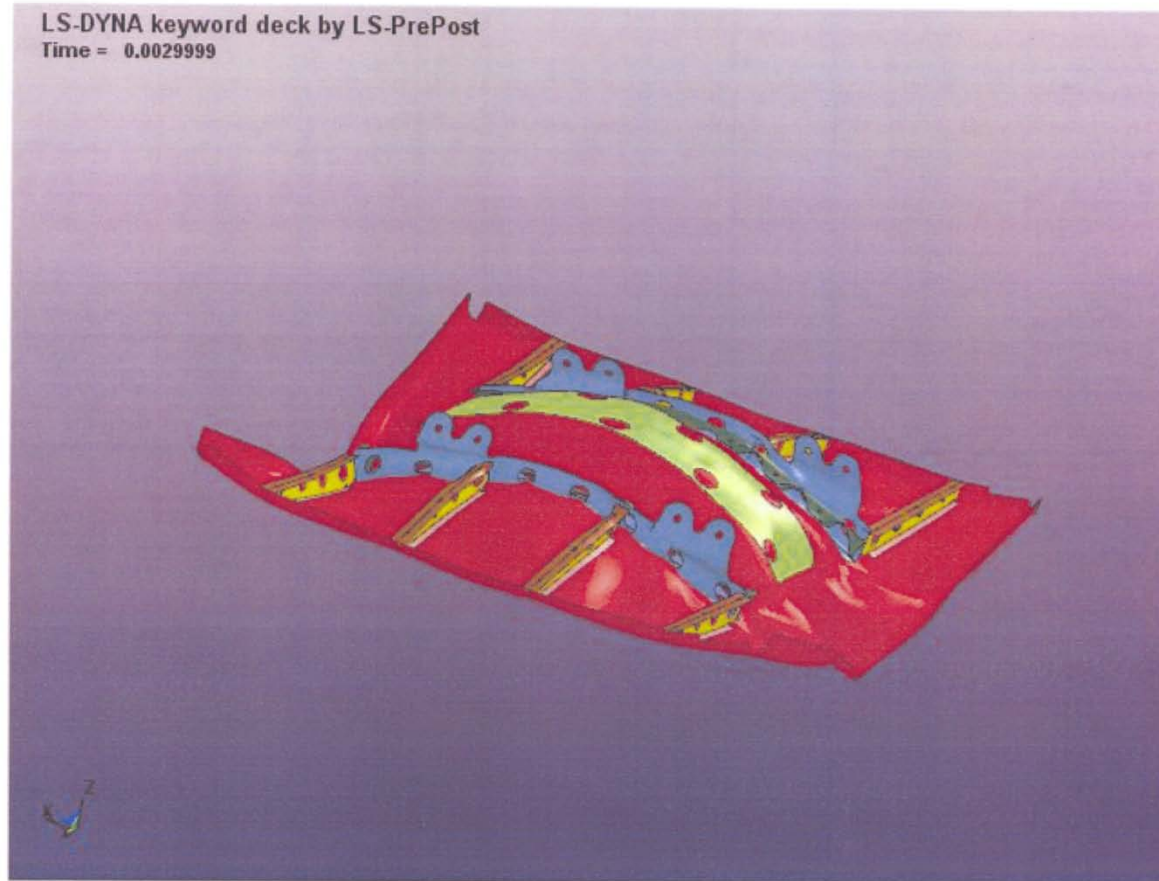




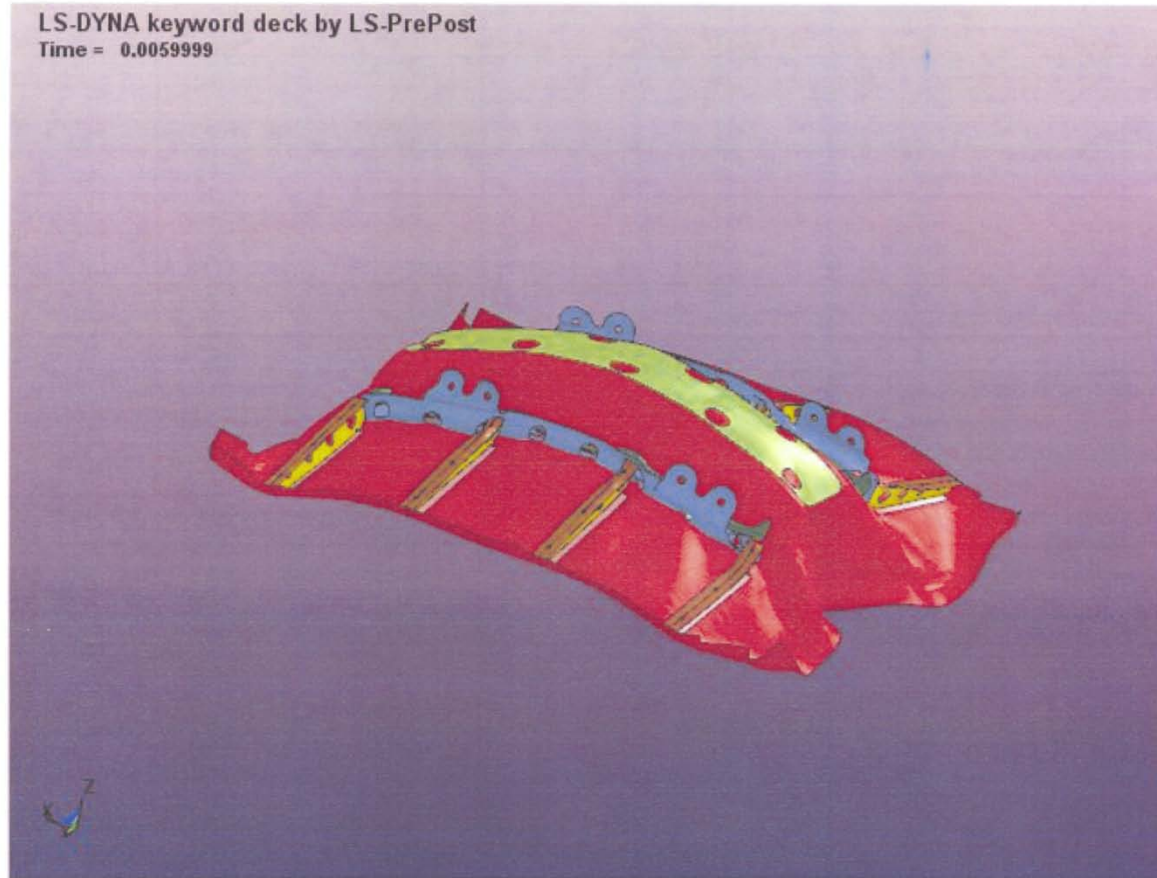


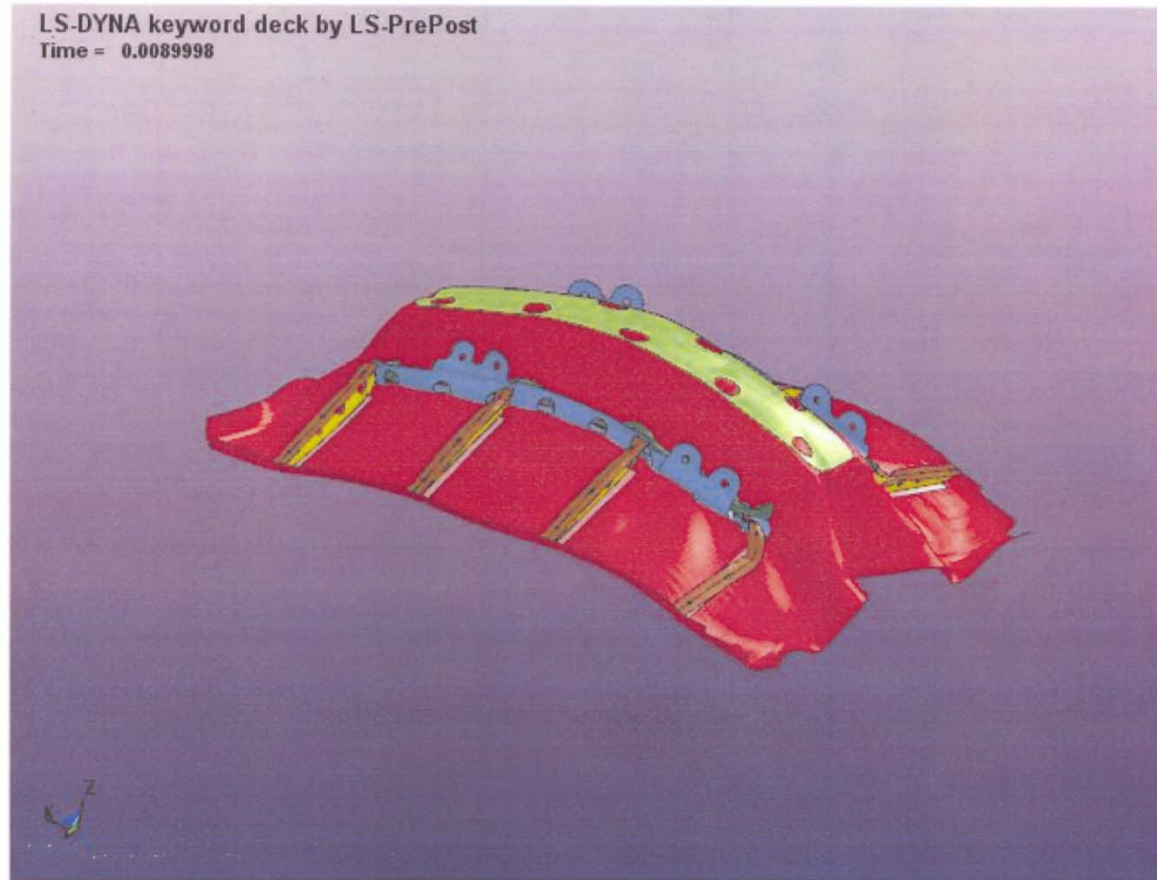


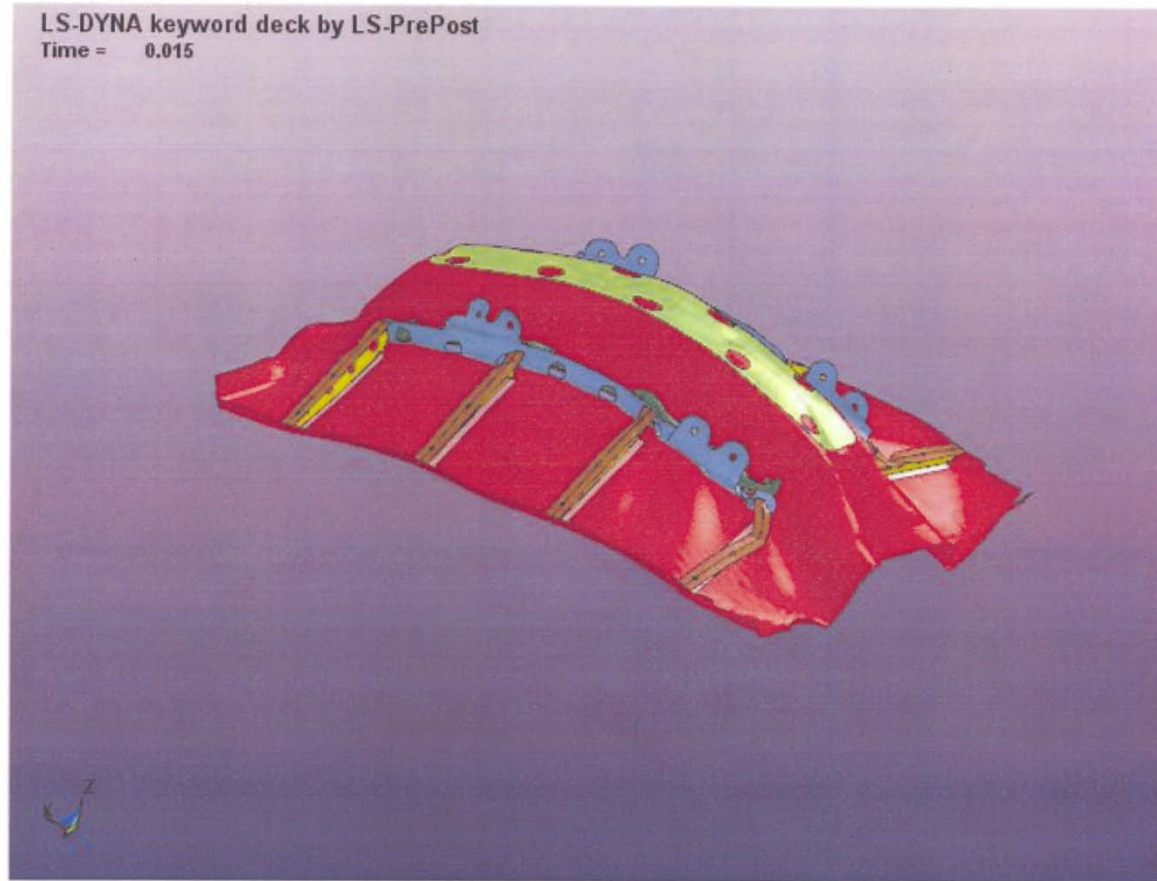


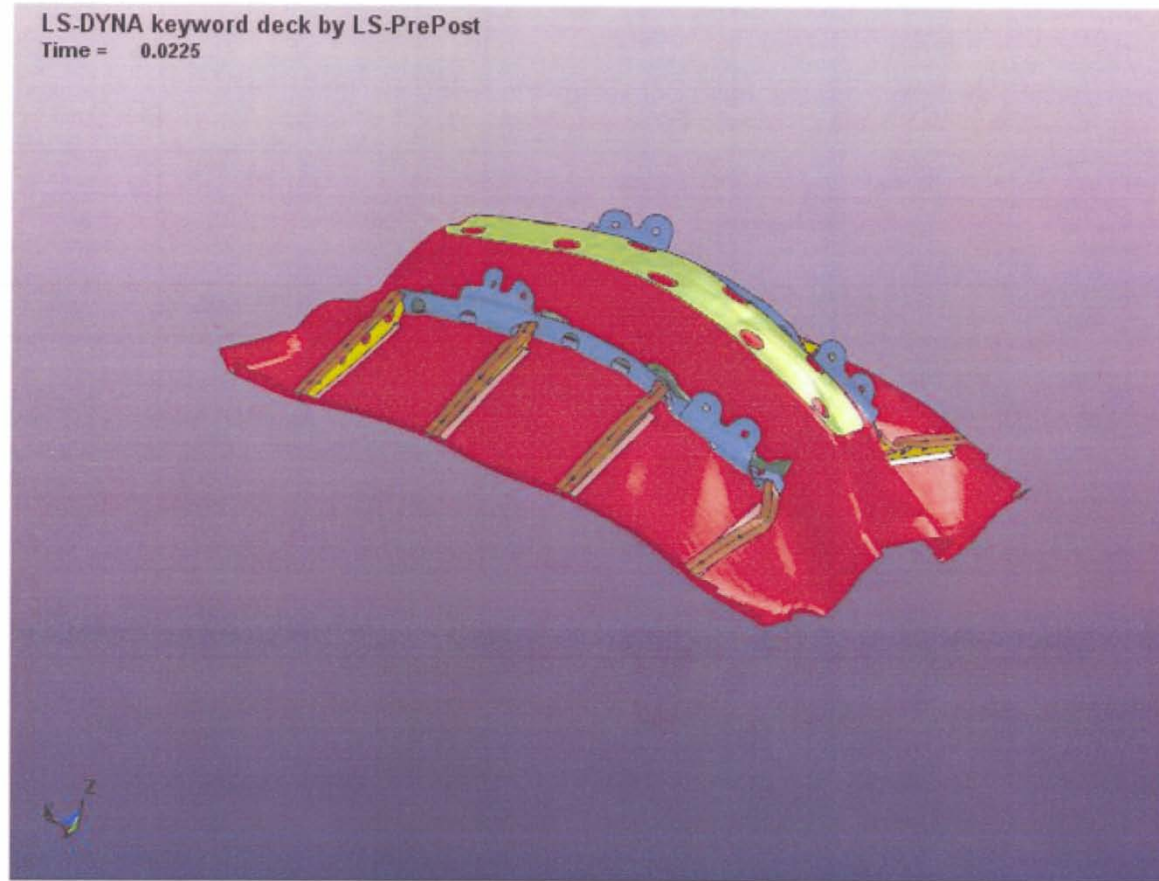




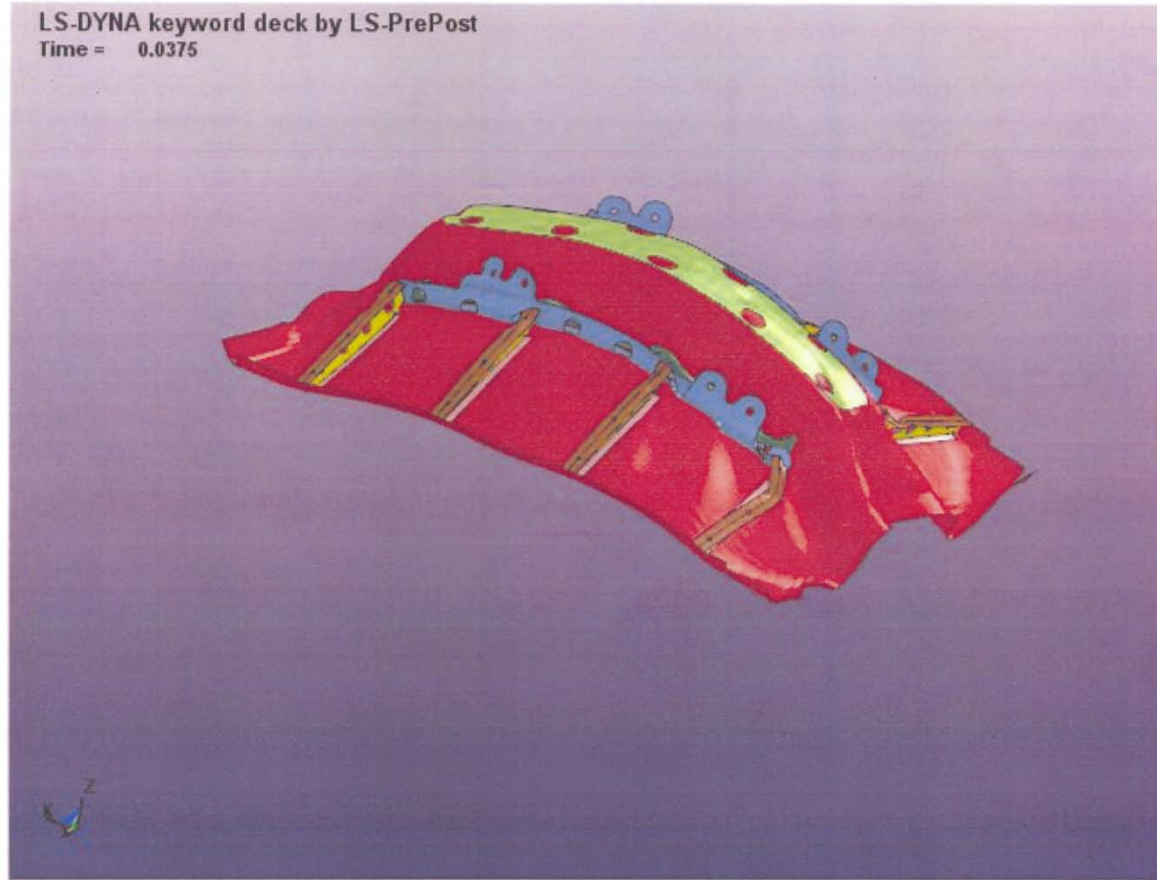


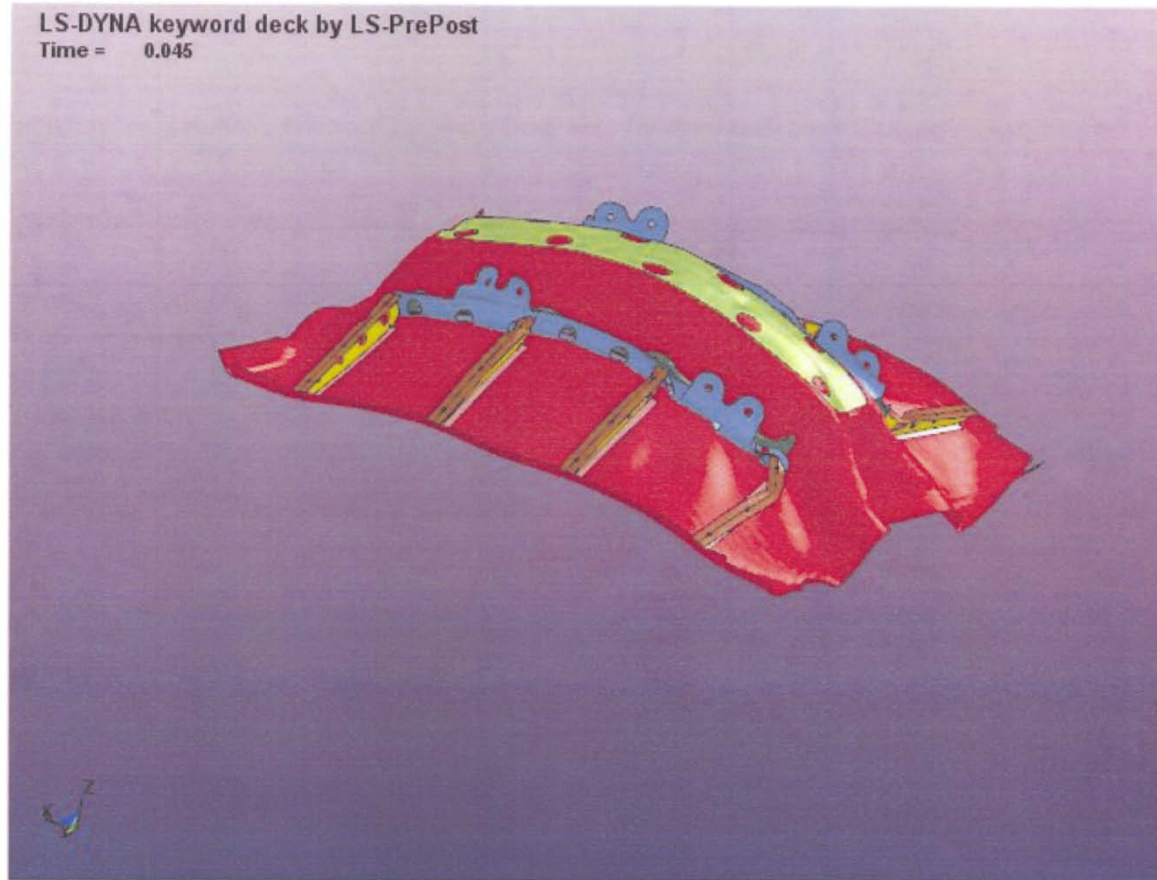


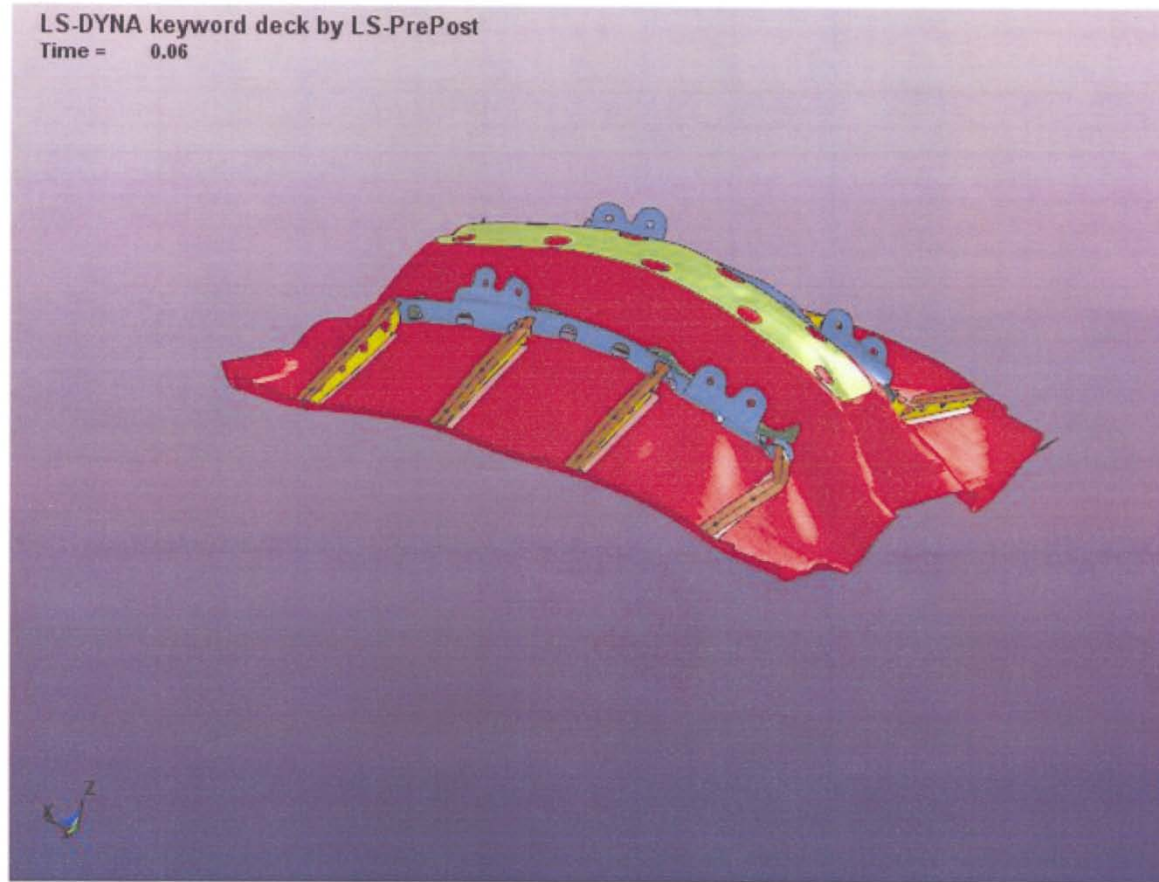




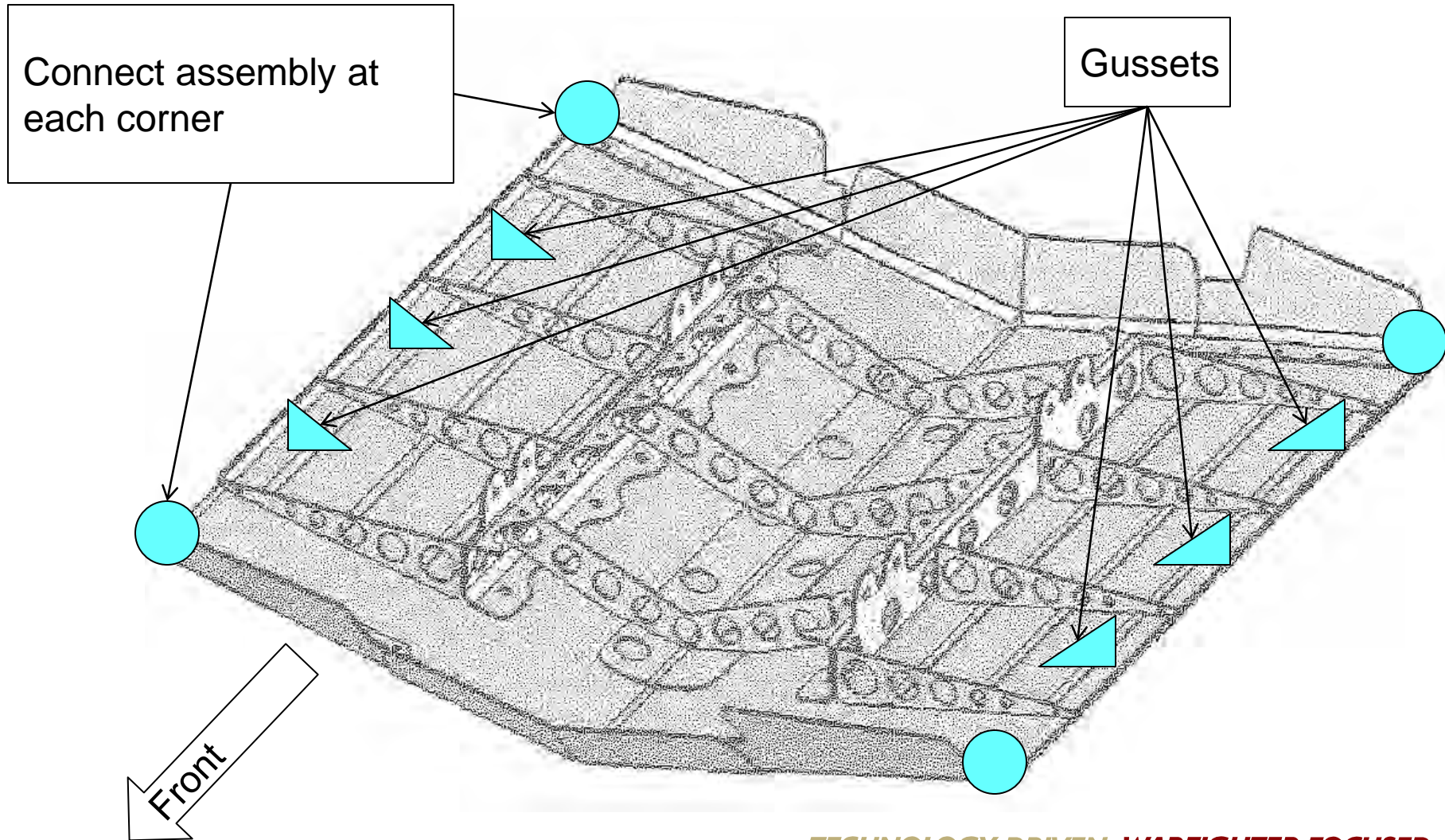






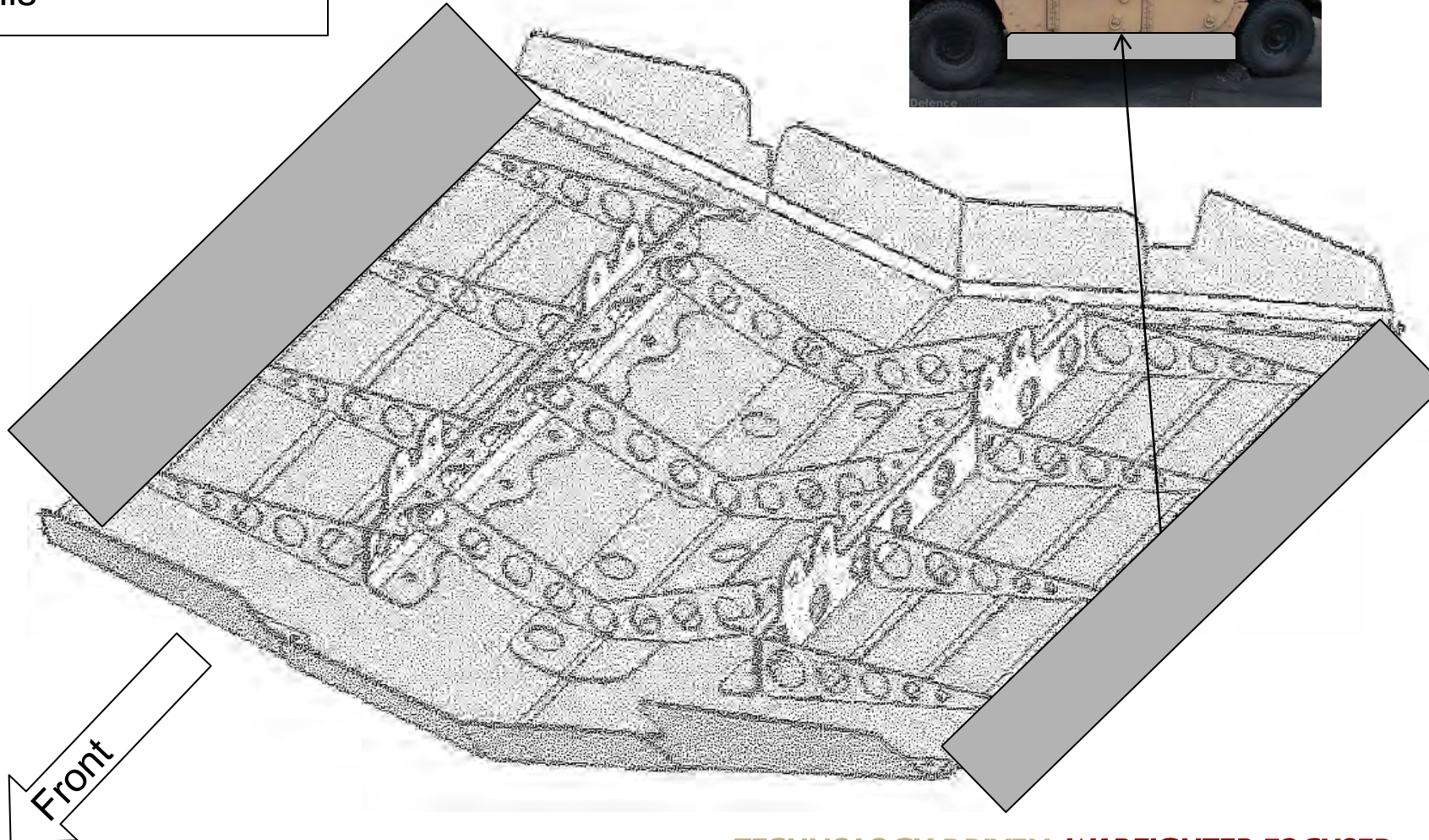
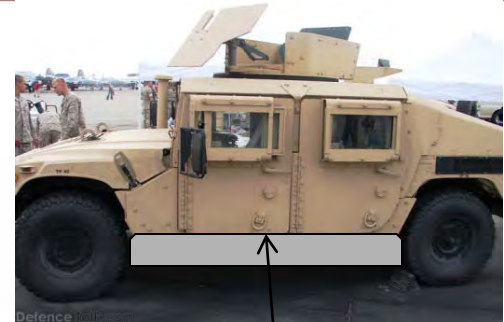


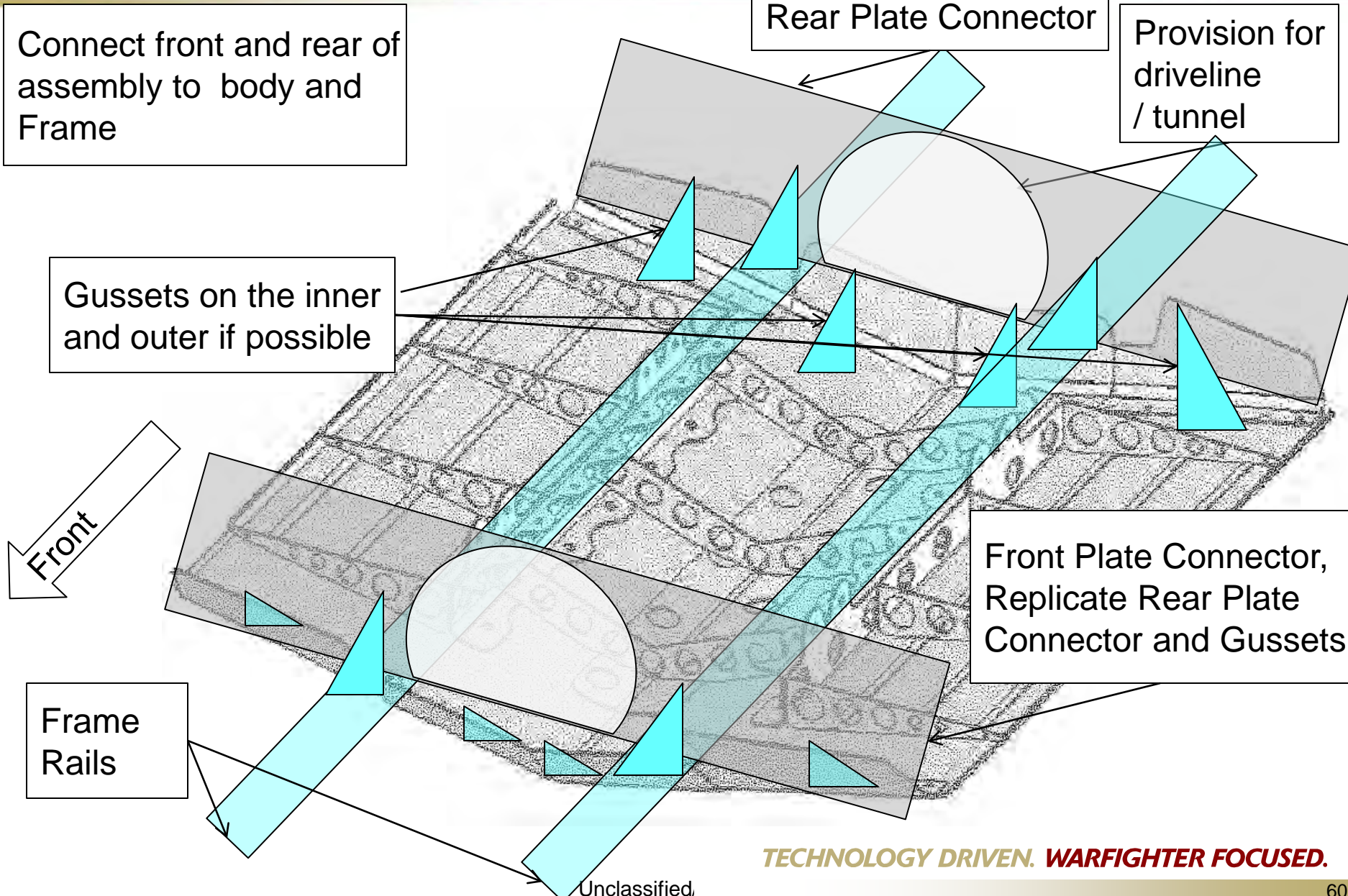
- **Performance of the 9° and 22° V-Hulls Produced:**
 - High accelerative loads
 - Unfavorable displacement



Extend Length and
Connect Assembly To
Side Sills

Increase overall
Thickness to 2"





- The system in its current configuration provides assembly issues due to the accessibility of the mounting holes
- Underbody produces an unfavorable drop in mobility
- Deformation to the underbody is not favorable and does not provide adequate protection from an underbody blast perspective
- To produce favorable results for Fit and Finish, Mobility and Blast it is strongly recommended that a complete redesign by the Contractor be considered
- The current design is not feasible for Fit and Finish, Mobility or Blast