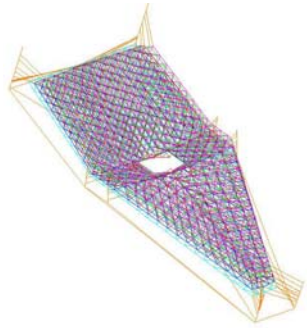
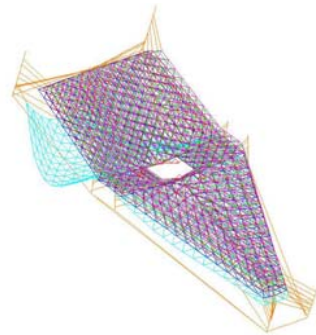


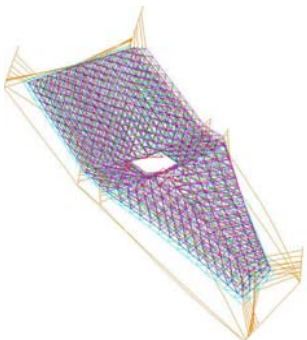
## Aerospace Case Study (L'Garde, Inc. – James Webb Space Telescope)



A finite element analysis using NEi Nastran was carried out on the Northrop-Grumman James Webb Space Telescope (JWST) Sunshield. The sunshield consists of five layers of material to shield the telescope optics from the sun to keep its temperature from going above a certain level. The above left figure shows the finite element model of the five-layer sunshield.



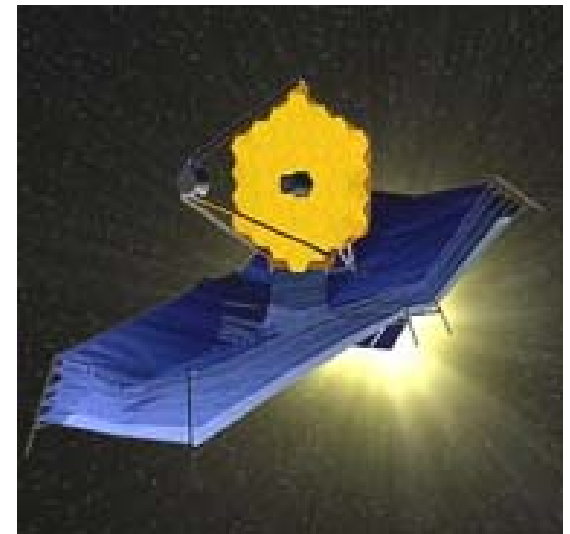
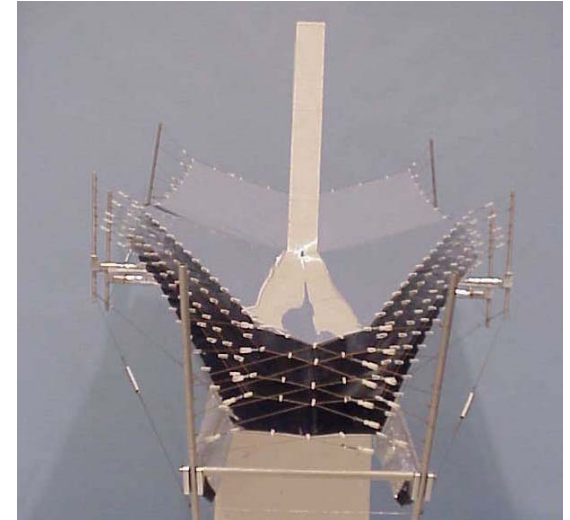
The above right figure shows the 1/10<sup>th</sup> scale sunshield fabricated by L'Garde, Inc. ([www.lgarde.com](http://www.lgarde.com)). Northrop-Grumman (then TRW) provided the 1/10th scale support hardware. Note the absence of membrane wrinkling at the design stress level.



A modal analysis was carried out using NEi Nastran. The middle left figure below shows the first membrane mode of frequency 0.404 Hz and a string tension of 5 lbs. The first support structure mode of 1.103 Hz and string tension of 5 lbs. is shown in the below left figure.

As a result of the study using NEi Nastran it was found that it is important to adjust the tension in the reaction cables properly. Moreover, it was recommended that the edges of the membrane be shaped accordingly using “catenaries” and attached to a perimeter cable to distribute the loads more evenly over the membrane.

**Printed with acknowledgement to L'Garde Inc., Northrop Grumman and TRW.**



**NEi Software, Inc.** is aggressively focused on commitment to the customer. Detailed documentation, customized on-site training, and comprehensive technical support ensures that you will see immediate return on your investment.

**For more information about our company or our products, please contact:**

**Headquarters:**

**NEi Software, Inc.**

5555 Garden Grove Blvd., Suite 300

Westminster, CA 92683-1886

USA

Phone: +1.714.899.1220

Fax: +1.714.899.1369

Email: [info@neisoftware.com](mailto:info@neisoftware.com)

Website: [www.NEiSoftware.com](http://www.NEiSoftware.com)

**Europe:**

**NEi Software EMEA Office**

The Old Barrel Store

Draymans Lane, Marlow

Buckinghamshire, SL7 2FF

United Kingdom

Phone: +44.0.1628.400.645

Fax: +44.0.1628.891.701

E-mail: [emea@neisoftware.com](mailto:emea@neisoftware.com)

Website: [www.NEiSoftware.com/emea](http://www.NEiSoftware.com/emea)

**Asia:**

**NEi Software Asia Office**

Shinjuku Park Tower

N30th Floor 3-7-1 Nishi-Shinjuku

Shinjuku-ku, Tokyo, 163-1030

Japan

Phone: +81.03.5326.3062

Fax: +81.03.5326.3001

E-mail: [asia@neisoftware.com](mailto:asia@neisoftware.com)



NEi Nastran *for Windows*  
From NEi Software, Inc.