

**From:** Mahendra Shah  
**To:** Bernard White; Daniel Huang; Robert Shewmaker; Roger Kenneally; Ron Parkhill  
**Date:** 8/27/02 12:08PM  
**Subject:** Fwd: FW: NRC Vulnerability Project (CTH: Stiffness?)

I am forwarding SNL e-mail regarding the aircraft model for your information. Thanks.

Mahendra

**CC:** Daniel Dorman; Jack Guttman

Portions of attachments Ex 2 E/40

Received: from igate.nrc.gov  
by nrcgwia.nrc.gov; Tue, 27 Aug 2002 10:54:42 -0400  
Received: from nrc.gov  
by smtp-gateway SMTPœ id KAA15047  
for <MJS3@nrc.gov>; Tue, 27 Aug 2002 10:52:19 -0400 (EDT)  
Received: from 132.175.109.4 by mm02snlnto.sandia.gov with ESMTP ( Tumbleweed MMS SMTP Relay (MMS v4.7)); Tue, 27 Aug 2002 08:55:23 -0600  
X-Server-Uid: 95b8ca9b-fe4b-44f7-8977-a6cb2d3025ff  
Received: from es08snlnt.sandia.gov (es08snlnt.sandia.gov [134.253.130.11]) by mailgate2.sandia.gov (8.12.5/8.12.5) with ESMTP id g7REtjh8017939 for <MJS3@nrc.gov>; Tue, 27 Aug 2002 08:55:45 -0600 (MDT )  
Received: by es08snlnt.sandia.gov with Internet Mail Service ( 5.5.2653.19) id <PD41CJMS>; Tue, 27 Aug 2002 08:55:45 -0600  
Message-ID: <B51F0C636E578A4E832D3958690CD73EA07ED4@es04snlnt>  
From: "Smith, Jeffrey" <jasmith@sandia.gov>  
To: "Mahendra Shah" <MJS3@nrc.gov>  
Subject: FW: NRC Vulnerability Project (CTH: Stiffness?)  
Date: Tue, 27 Aug 2002 08:55:42 -0600  
MIME-Version: 1.0  
X-Mailer: Internet Mail Service (5.5.2653.19)  
X-Filter-Version: 1.8 (sass2426)  
X-WSS-ID: 11754D511134409-01-01  
Content-Type: text/plain;  
charset=iso-8859-1  
Content-Transfer-Encoding: 7bit

Mahendra:

Bellow is that response from the Greg Wyss and the analyst doing the computations for the Research work.

It is as we suggested, we are using the same models. There is some misunderstanding regarding the models "Stiffness." The main stiffness is modeled with the porous aluminum model which is discussed in a previous e-mail I forwarded to you.

Jeff

> -----Original Message-----  
> From: Wyss, Gregory  
> Sent: Thursday, August 22, 2002 4:42 PM  
> To: Smith, Jeffrey  
> Cc: Sorenson, Ken B; Sprung, Jeremy L; Camp, Allen; Arguello Jr, Jose G  
> Subject: RE: NRC Vulnerability Project  
>  
>  
> My responses are below. Lupe, if I am mischaracterizing the CTH airplane  
> model, please help me clarify.  
>  
> Thanks  
>  
> Greg  
>  
>  
> -----Original Message-----

> From: Smith, Jeffrey  
 > Sent: Wednesday, August 21, 2002 2:14 PM  
 > To: Wyss, Gregory  
 > Cc: Sorenson, Ken B; Sprung, Jeremy L  
 > Subject: NRC Vulnerability Project

> Greg:

> I was just talking to Mahendra Shah at the NRC about aircraft speed and  
 > aircraft models for analysis. Mahendra and his boss, Jack Guttman want to  
 > make sure we in 6141 are using the same as your analyses in 6400. He  
 > brought up two points that I would like to verify with you:

> 1) Jack Guttman and/or Mahendra have heard that the Research side are  
 > using an aircraft speed of [ ] for some of your analyses. Is this  
 > true? If so, can you give me details of which analyses? Is this the whole  
 > aircraft into a structure?  
 > [Wyss, Gregory] We are using [ ]

Ex 2

Ex 2

> 2) They have also heard that some of your models of the aircraft did not  
 > include the stiffness of the aircraft (only the mass). Is this true?  
 > [Wyss, Gregory] Many people characterize (or, I think, mischaracterize)  
 > the CTH model of the aircraft as only having the mass but not the  
 > stiffness. We are using the same CTH model for an aircraft that has been  
 > being used in 9000 for several months. It has two materials: fuel (fluid)  
 > and "other structure." The "other structure" has physical properties that  
 > I believe include some stiffness and rigidity. This aircraft model does  
 > not, however, have a "hard" material to represent rotors or landing gear.  
 > It is not a fully accurate structural model, but it is certainly more than  
 > just a bunch of independent mass globules flying together in unison toward  
 > the building. Remember that the building is made up of a concrete  
 > material, and I don't hear people complaining that there is no stiffness  
 > in the building model, so CTH can model stiffness if it is built into the  
 > material properties. We can argue about whether the aircraft stiffness is  
 > CORRECT, but I don't think we can argue that it doesn't exist!

> With PRONTO, we have been using a Riera forcing function to simulate the  
 > aircraft.

> I think it might be a help for us to find a forum where the 6100 and 6400  
 > people can verify these issues. Who on the 6400 side can speak to these  
 > issues?

> Jeff

> .....  
 > \*\* Jeffrey A Smith  
 > \*\*  
 > \*\* Sandia National Laboratories \*\*  
 > \*\* Transportation Risk & Packaging \*\*  
 > \*\* 505-845-0299  
 > \*\*  
 > \*\* 505-844-0244 (fax)  
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Portions Ex 2