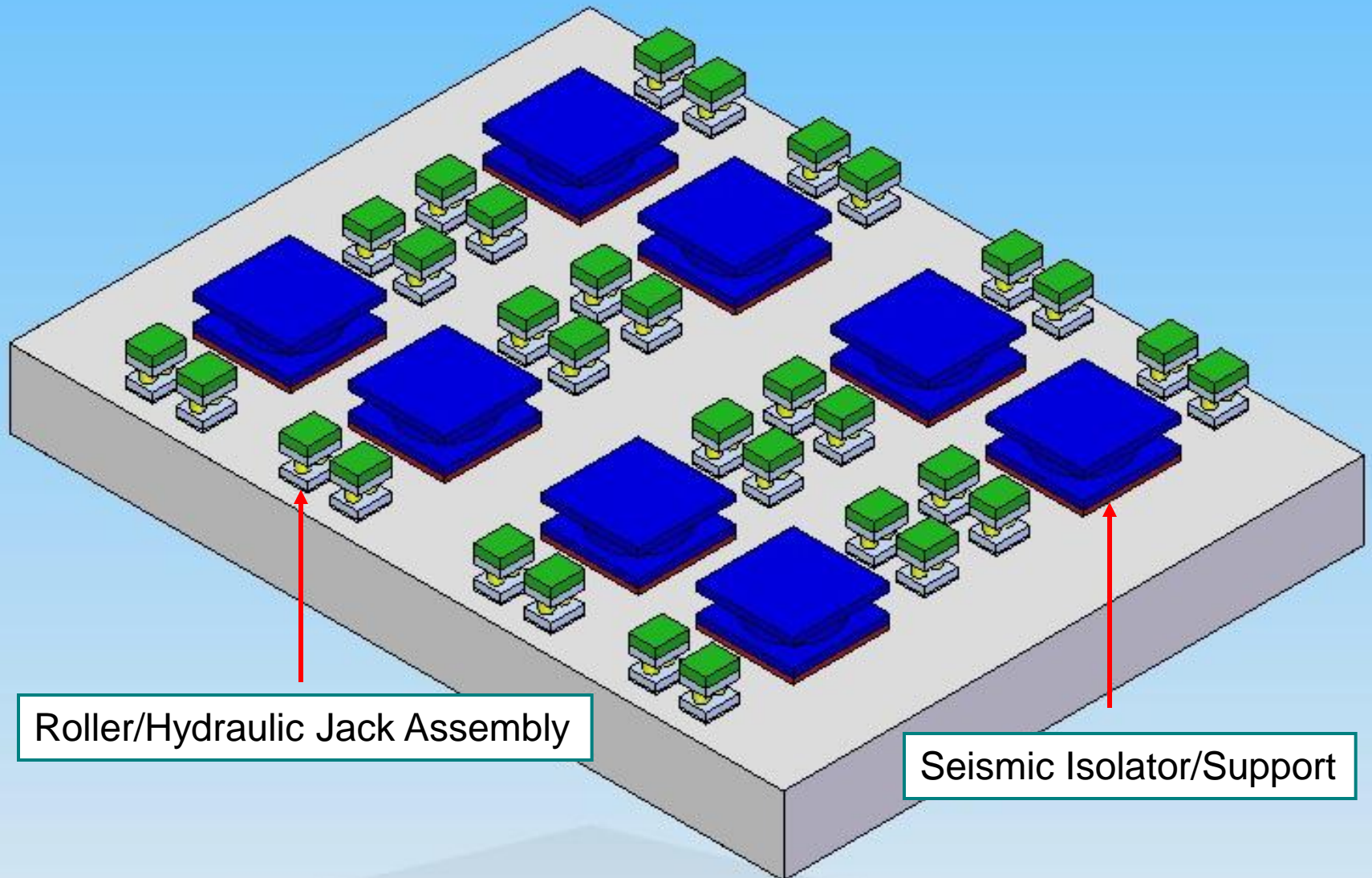


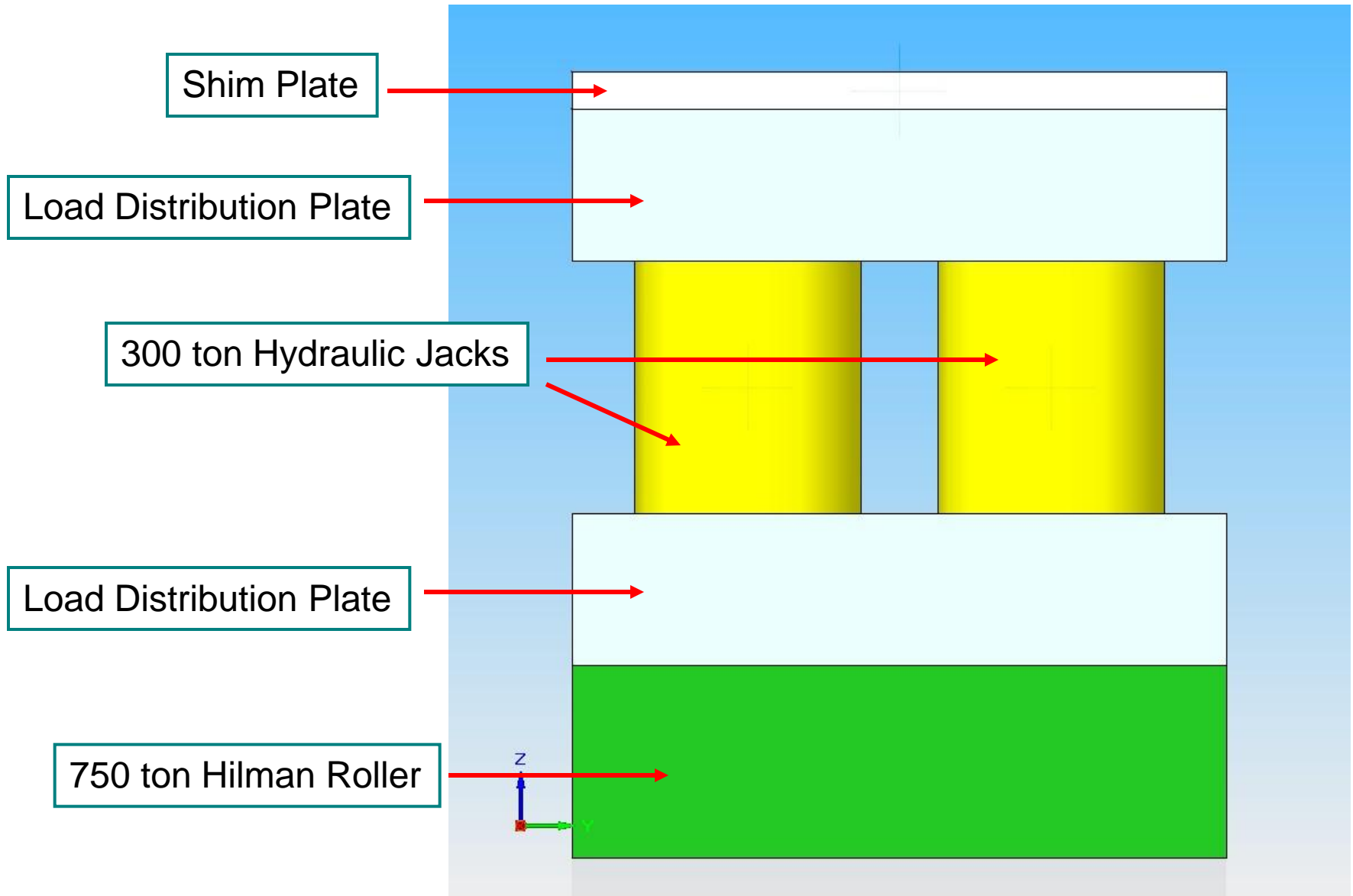
# ILC MDI Platform Concept

John Amann

# Platform with Hilman Rollers



# Roller/Jack Assembly

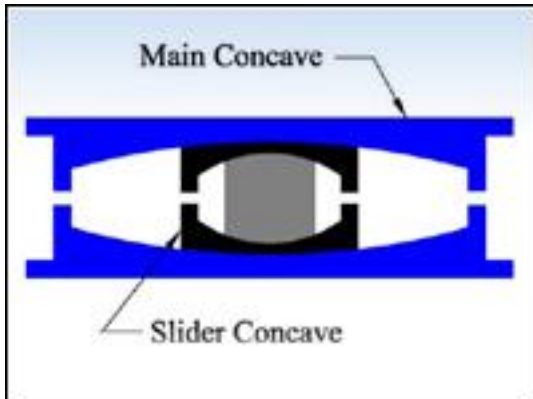
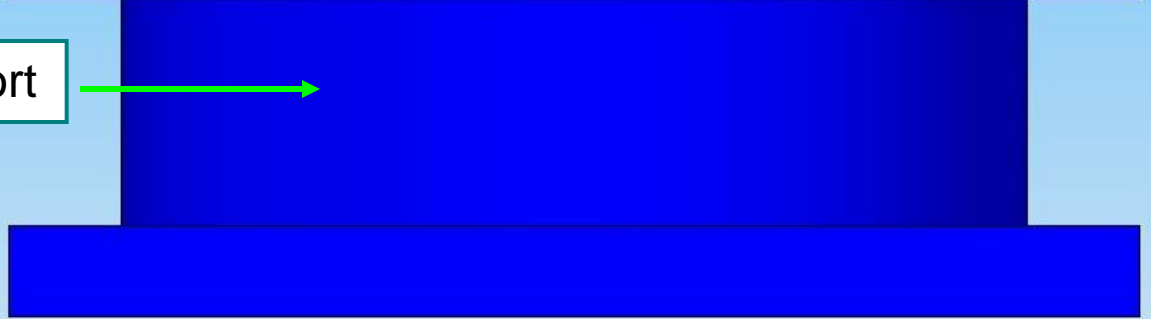


# Seismic Isolator Support

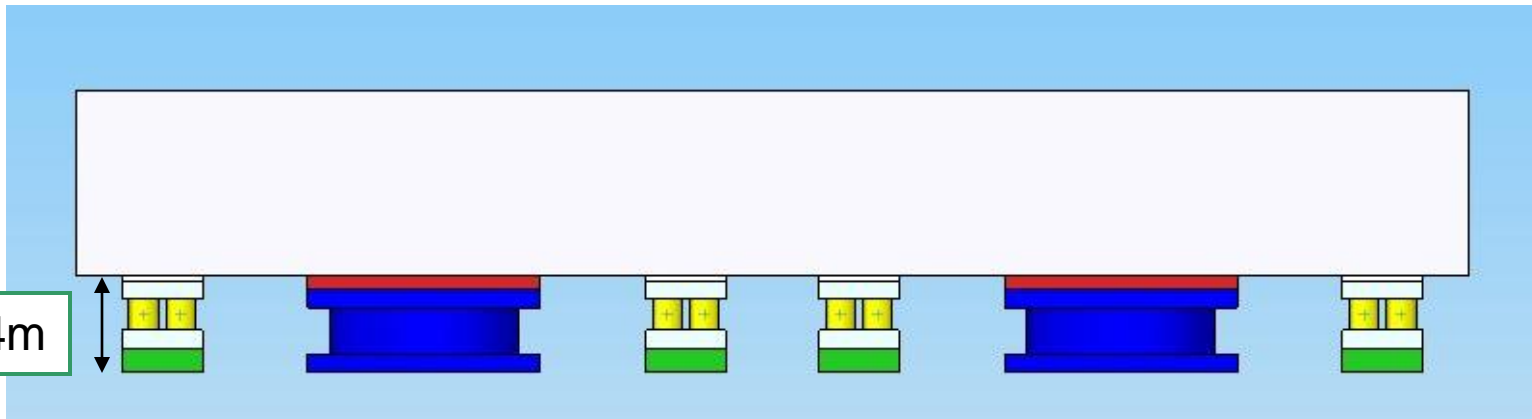
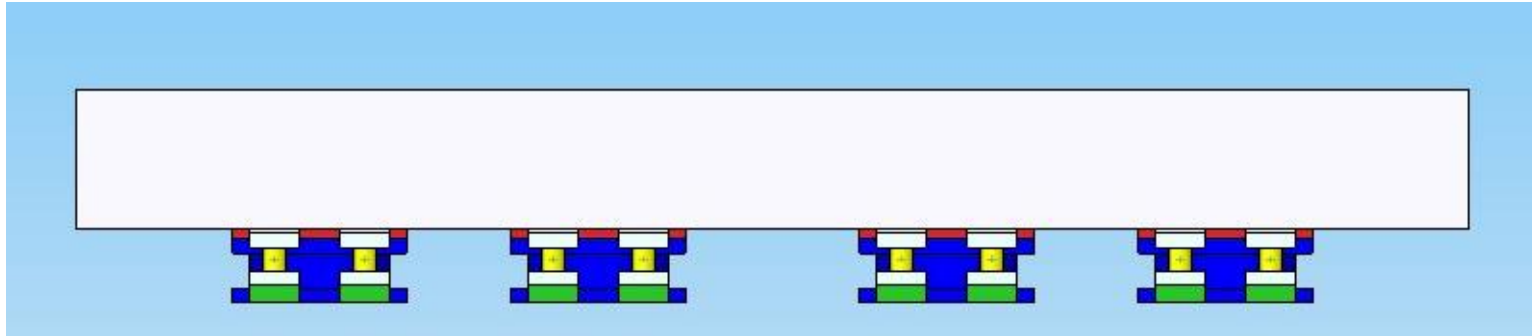
Laminated Shim



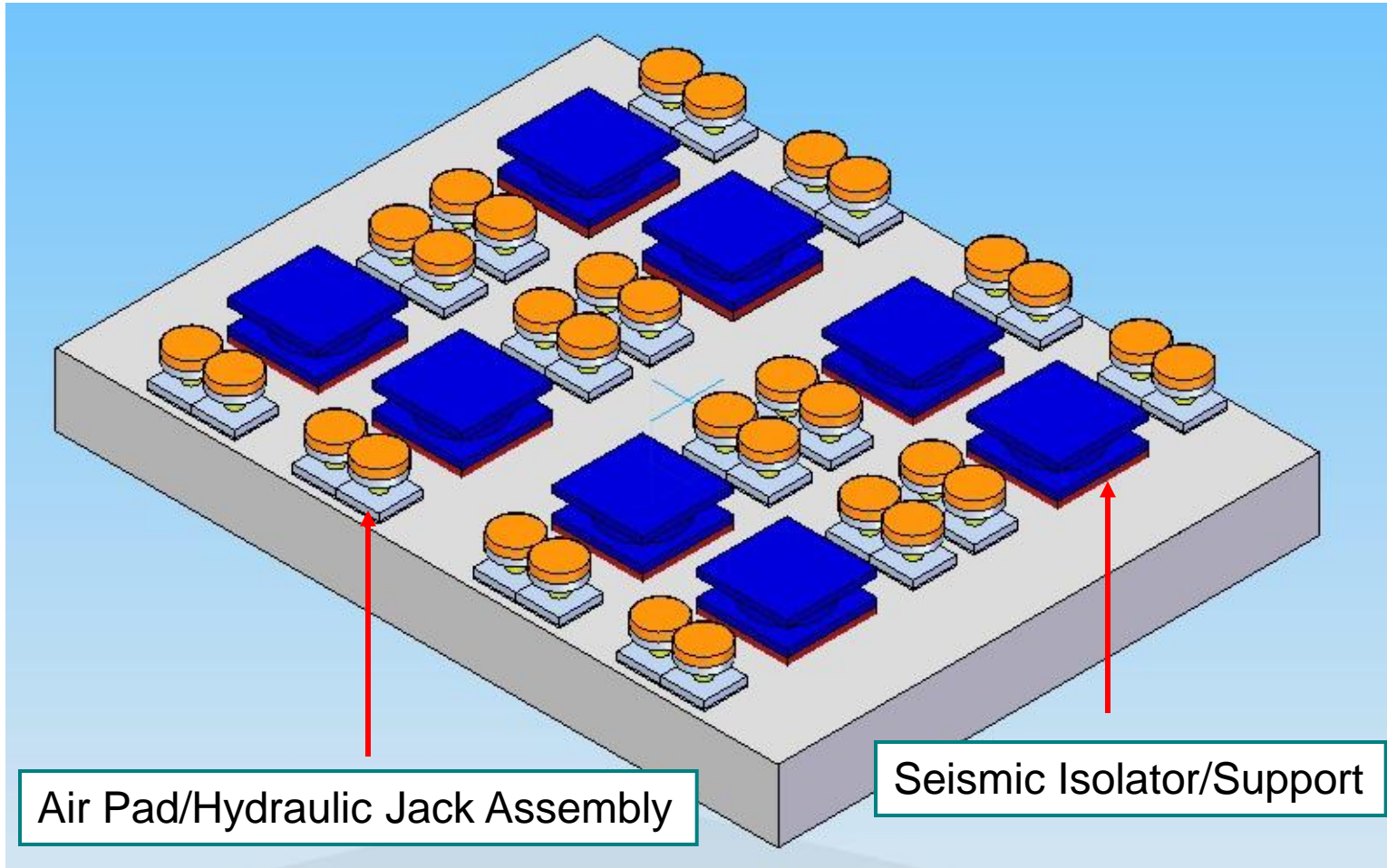
2 kTon Seismic Isolator Support



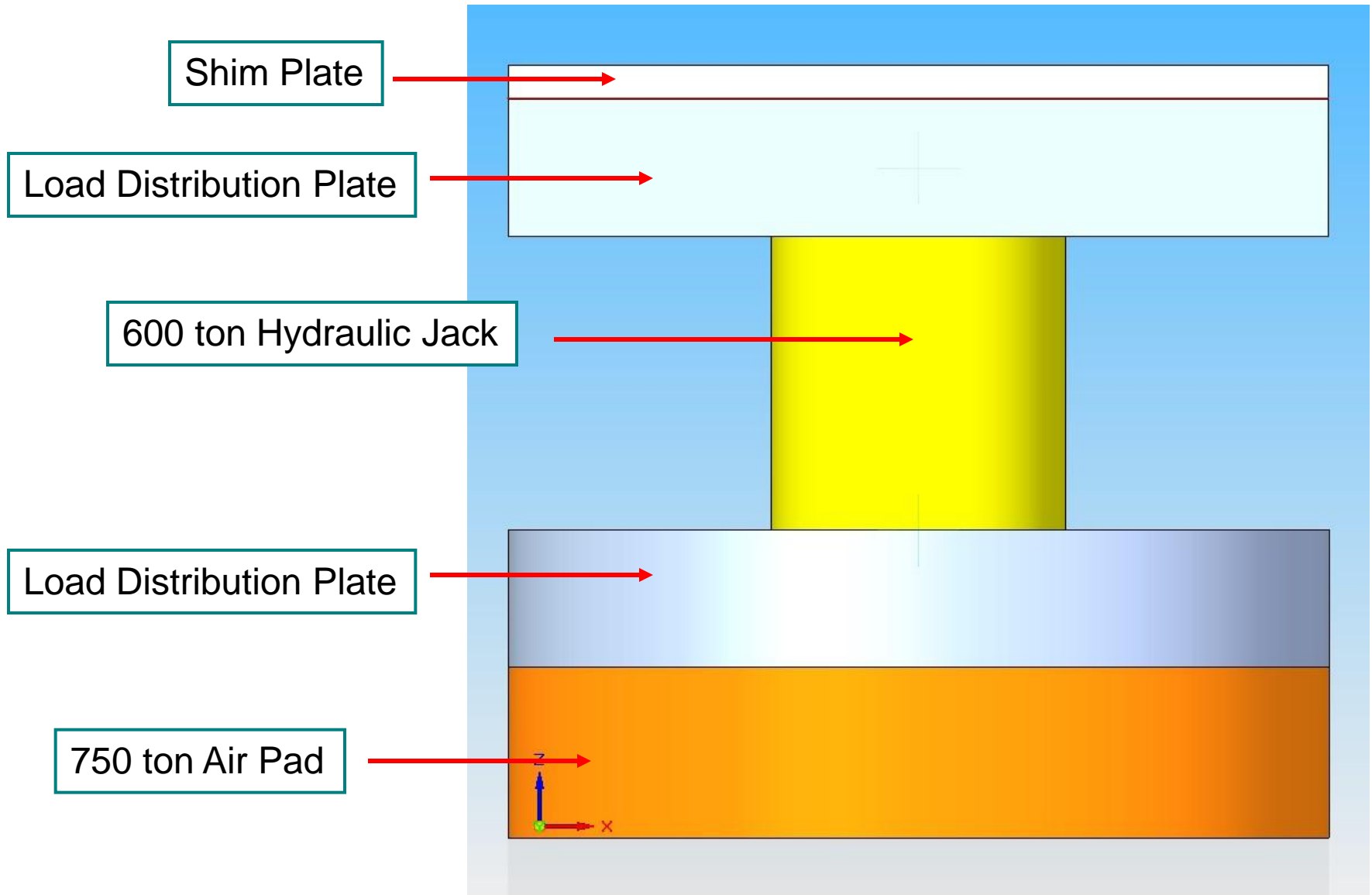
# Platform with Hilman Rollers



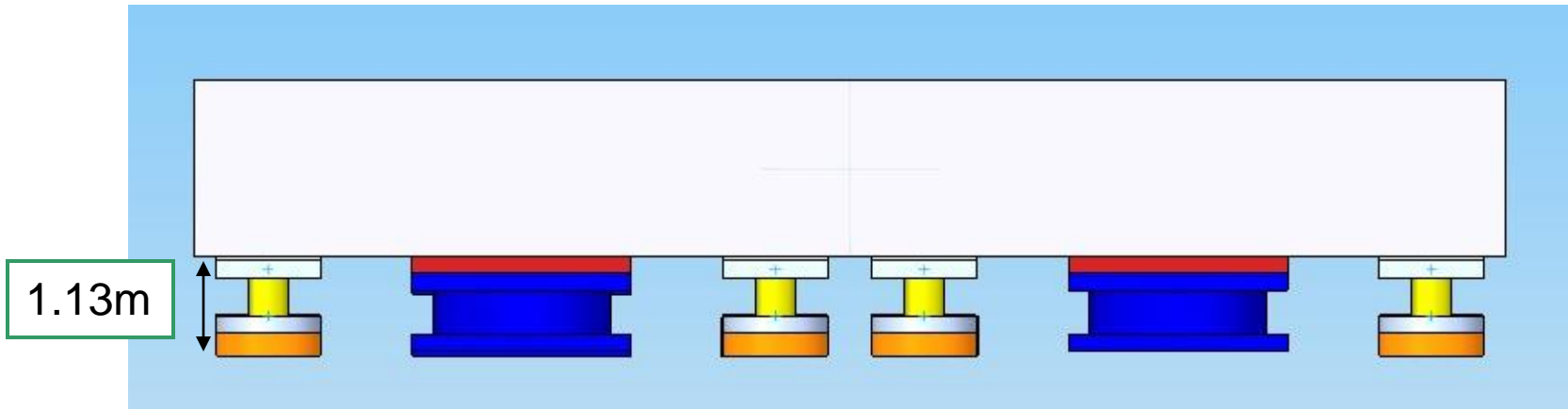
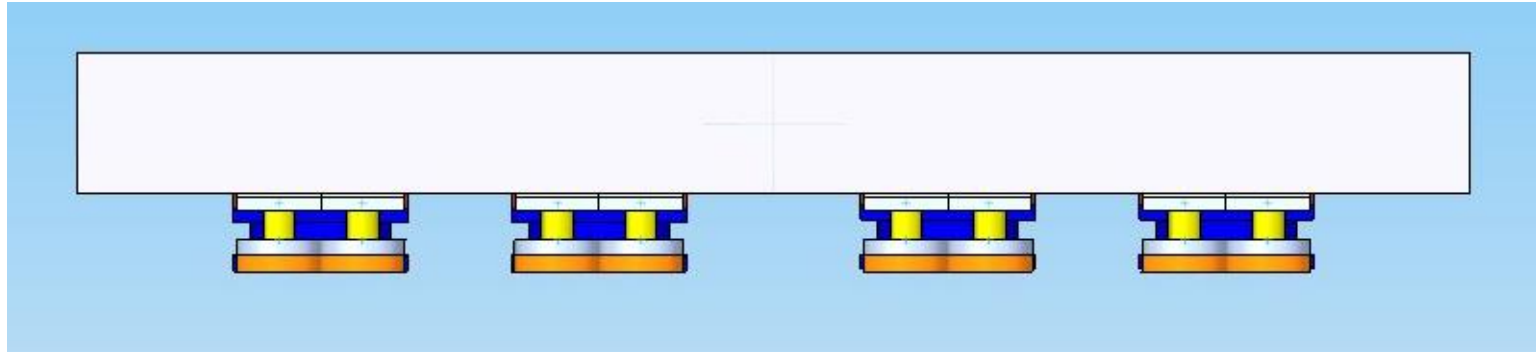
# Platform with Air Pads



# Air Pad/Jack Assembly

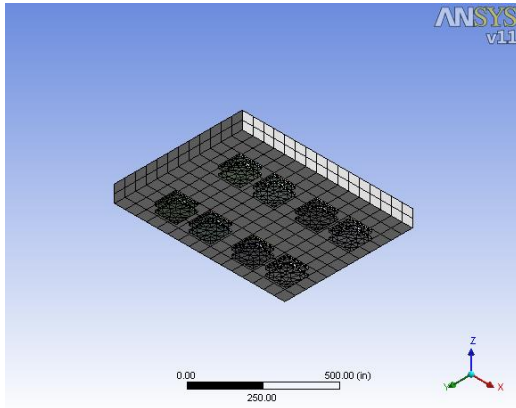


# Platform with Air Pads



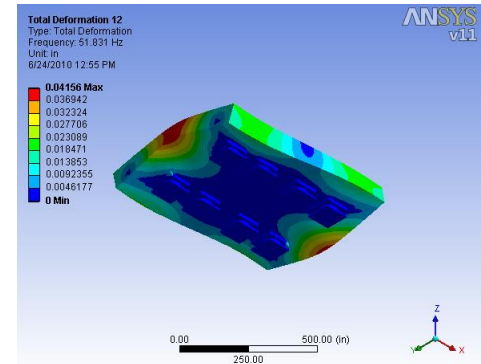
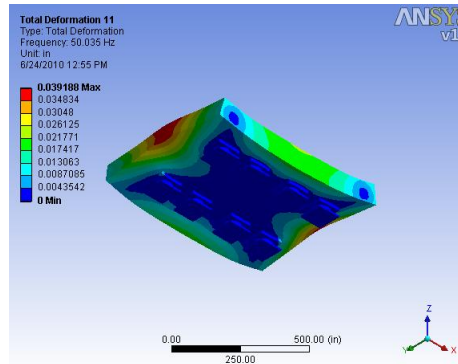
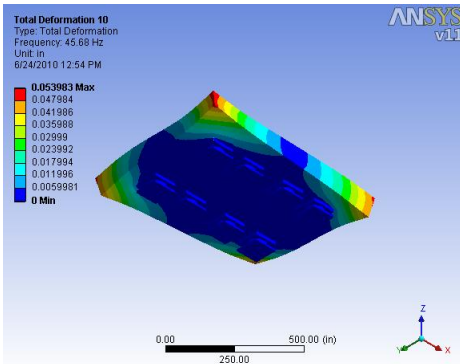
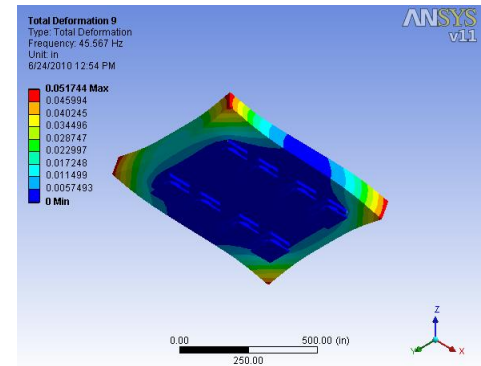
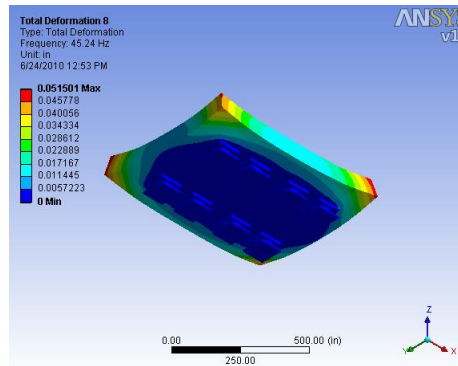
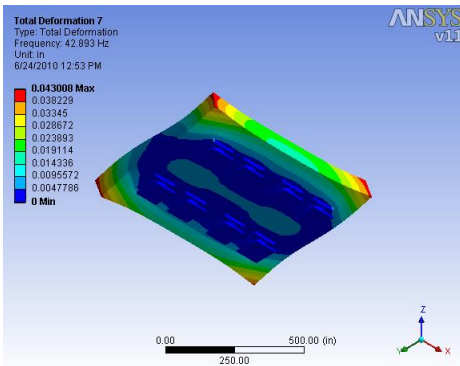


# Vibration Modes



Mode - Freq [Hz]

1. 42.893
2. 45.24
3. 45.567
4. 45.68
5. 50.035
6. 51.831



# Random Vibration Analysis

(from ANSYS Workbench help)

## Introduction

- This analysis enables you to determine the response of structures to vibration loads that are random in nature. An example would be the response of a sensitive electronic component mounted in a car subjected to the vibration from the engine, pavement roughness, and acoustic pressure.
- Loads such as the acceleration caused by the pavement roughness are not deterministic, that is, the time history of the load is unique every time the car runs over the same stretch of road. Hence it is not possible to predict precisely the value of the load at a point in its time history. Such load histories, however, can be characterized statistically (mean, root mean square, standard deviation). Also random loads are non-periodic and contain a multitude of frequencies. The frequency content of the time history is captured (spectrum) along with the statistics and used as the load in the random vibration analysis. This spectrum, for historical reasons, is called Power Spectral Density or PSD.
- In a random vibration analysis since the input excitations are statistical in nature, so are the output responses such as displacements, stresses, and so on.
- Typical applications include aerospace and electronic packaging components subject to engine vibration, turbulence and acoustic pressures, tall buildings under wind load, structures subject to earthquakes, and ocean wave loading on offshore structures.

# Random Vibration Analysis

(from ANSYS Workbench help)

## Points to Remember

- The excitation(s) is applied in the form of Power Spectral Density (PSD). The PSD is a table of spectral values vs. frequency that captures the frequency content. The PSD captures the frequency and mean square amplitude content of the load's time history.
- The square root of the area under a PSD curve represents the root mean square (rms) value of the excitation. The unit of the spectral value of acceleration, for example, is  $G^2/\text{Hertz}$ .
- The input excitation is expected to be stationary (the average mean square value does not change with time) with a zero mean.
- This analysis is based on the mode superposition method. Hence a [modal analysis](#) that extracts the natural frequencies and mode shapes is a prerequisite.
- This feature covers one type of PSD excitation only- base excitation.
- The base excitation could be an acceleration PSD (either in acceleration<sup>2</sup> units or in  $G^2$  units), velocity PSD or displacement PSD.
- The base excitation is applied in the specified direction to all entities that have a [Fixed Support](#) boundary condition. Other support points in a structure such as **Frictionless Surface** are not excited by the PSD.
- Multiple uncorrelated PSDs can be applied. This is useful if different, simultaneous excitations occur in different directions.

