ANALYSIS OF A STRUCTURE ON THE MOON

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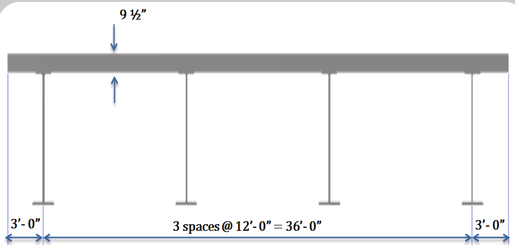
ABSTRACT

As technology quickly advances, a future in space is not hard to imagine. Building a future for our civilization in space will require the construction of various structures. In order to do so we must change the way we design our structures in a new atmosphere. The most familiar place to explore with is the moon. The purpose of this research is to explore the design parameters that would need to be changed when designing a structure on the moon. Using a single span bridge with different conditions were explored.

EARTH vs. MOON

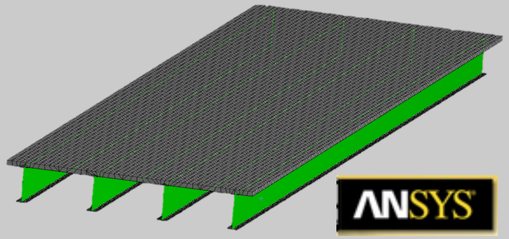
- Gravity
- Geology
- Erosion
- Collision
- Vacuum Effect
- Solar Winds
- Seismic
- Temperature Changes

STUDY STRUCTURE



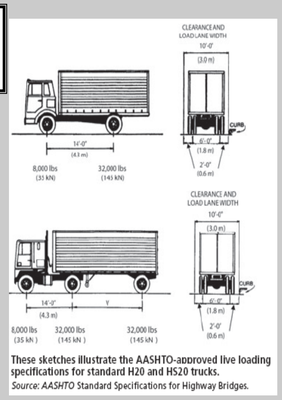
- Girders : 4
- Yield Strength: 50 ksi structural Steel
- Boundary Conditions: both end fixed

COMPUTER MODELING

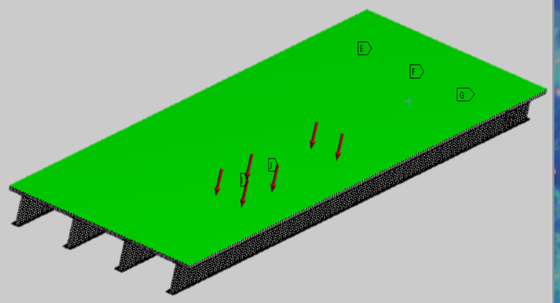


LOAD CASES

- Design Vehicle (HL-93 Tandem and Live Load)
- Self-Weight
- Temperature Change

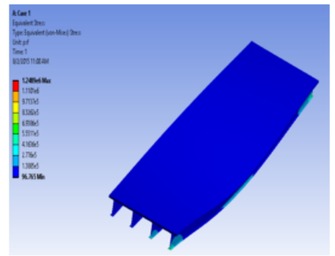
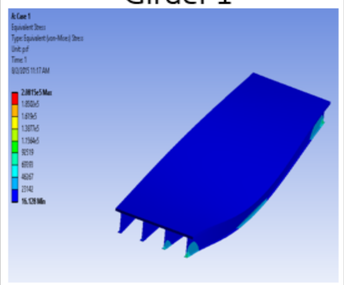
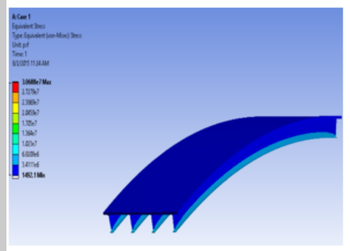
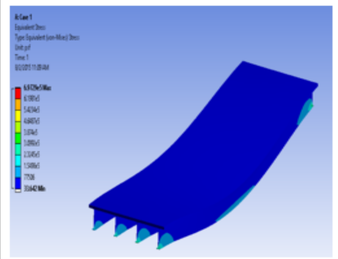
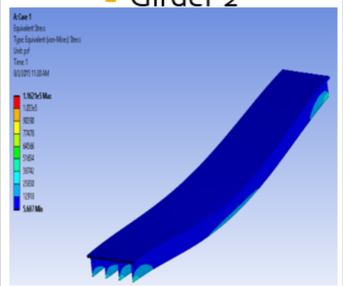
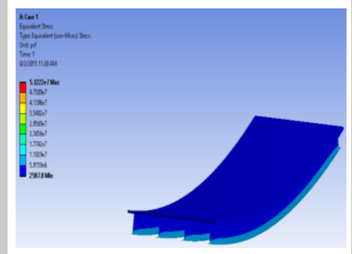


LOAD APPLICATION



- HL-93 Design vehicle application

RESULTS : MAXIMUM STRESS

EARTH	MOON	TEMPERATURE CHANGE ON THE MOON
Girder 1	Girder 1	253˚F
		
1 ksi	0.2 ksi	35 ksi
Girder 2	Girder 2	-243˚F
		
0.6 ksi	0.1 ksi	60 ksi

CONCLUSION

After completing the research it was determined that the greatest effect when designing a structure on the moon is that of temperature. Using the temperature change effect the structure was further analyzed. Upon the completion of the further analysis it was determined that the structure would not be able to withstand the thermal load. Other materials were considered to determine if they would be able to withstand the design conditions. Such materials are that of aluminum and titanium, further analysis will determine if these material are suitable for a design on the moon. The other conclusion determined from this research is that of changing boundary conditions of the structure to other than fixed supports such as a pin and roller.

REFERENCES

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ACKNOWLEDGEMENTS

Thanks to Dr. Chang, Tagliatela College of Engineering, Summer Undergraduate Research and the University of New Haven for all their support throughout this research.