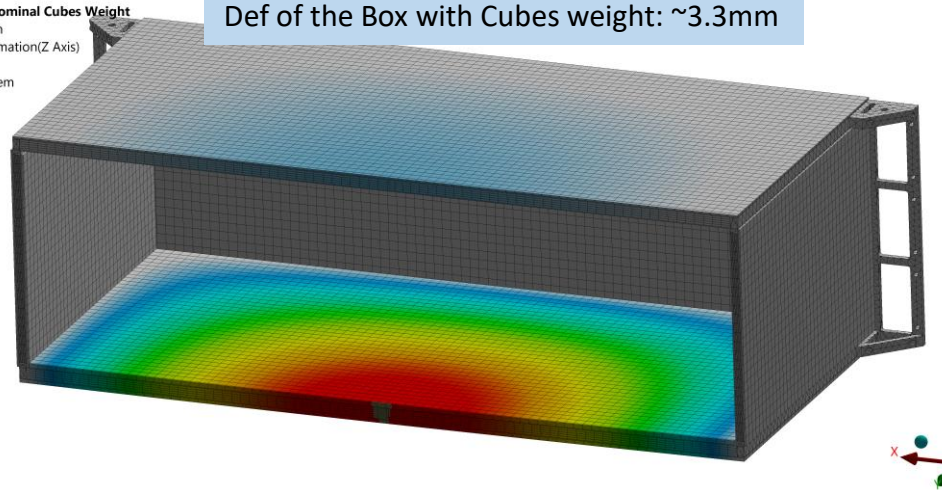


BOX FEA RESULTS

- Deformations at the Box caused by using crane are negligible.
- Vibrations induced from the crane are for sure not worse than vibrations caused by an earthquake

C: Static with G and Nominal Cubes Weight
 Directional Deformation
 Type: Directional Deformation(Z Axis)
 Unit: mm
 Global Coordinate System
 Time: 1
 Custom
 Max: 0.0083336
 Min: -3.3205



Estimated Amplitude of the Box under Random Vibrations

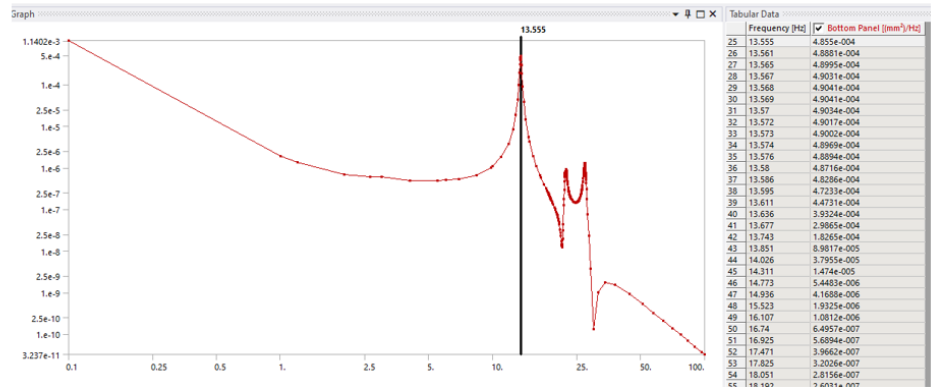
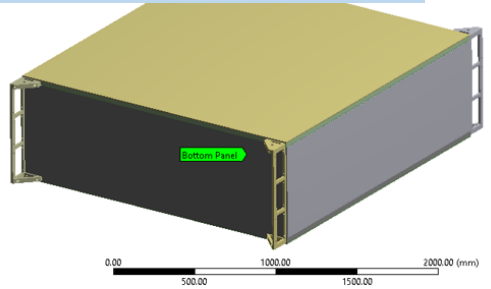


Figure 6-59 Scenario 1 – Vibration in Z direction – Results at the Bottom Panel

A peak is found at 13,555 [Hz] with a PSD of 4.855e⁻⁴ [(mm²)/Hz]

Indicatively vibrational amplitude derived of the Top Panel → A= 0.081 mm

Def of the Box with Cubes weight: ~3.3mm

Max Crane Acceleration considered for Lifting Device Design:

- Additional 0.1g in every direction

EUROPEAN STANDARD **EN 13155**
 NORME EUROPÉENNE
 EUROPÄISCHE NORM
 December 2020

ICS 53.020.30 Supersedes EN 13155:2003+A2:2009

English Version
 Crane - Safety - Non-fixed load lifting attachments

Appareils de levage à charge suspendue - Sécurité - Accessoires de levage amovibles
 Krane - Sicherheit - Lose Lastaufnahmemittel

This European Standard was approved by CEN on 17 January 2020.

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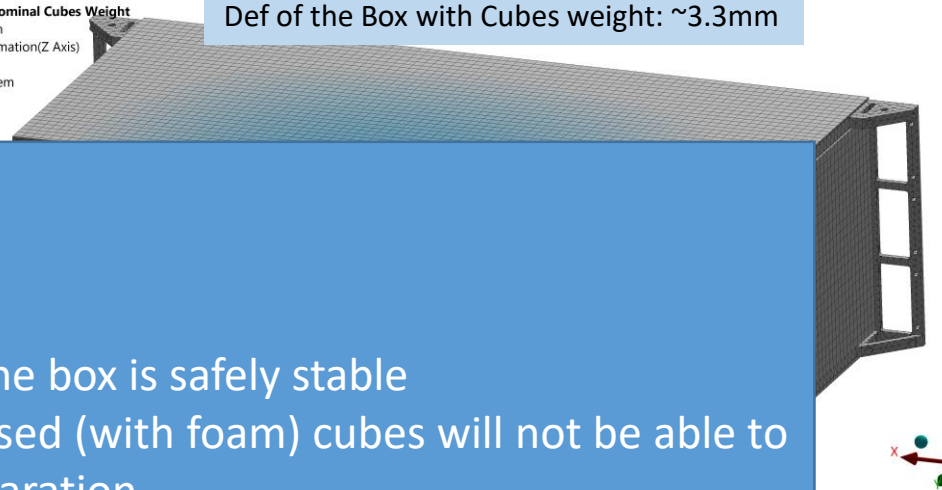
Semi-Static FEA were done assuming 0.65g in every direction



BOX FEA RESULTS

C: Static with G and Nominal Cubes Weight
 Directional Deformation
 Type: Directional Deformation(Z Axis)
 Unit: mm
 Global Coordinate System
 Time: 1
 Custom
 Max: 0.0083336

Def of the Box with Cubes weight: ~3.3mm



- Deformations at the Box caused by using crane are negligible.
- Vibrations induced not worse than vibrations from an earthquake

Conclusions:

- From mechanical point the box is safely stable
- Once the SFGD Box is closed (with foam) cubes will not be able to move due to crane acceleration.

Risks by considering multiple manipulations:

- Increased possibility to have an earthquake during operation
- Human Error → shock against obstacle
 → bad fixing at the Lifting device

Estimated Amplitude

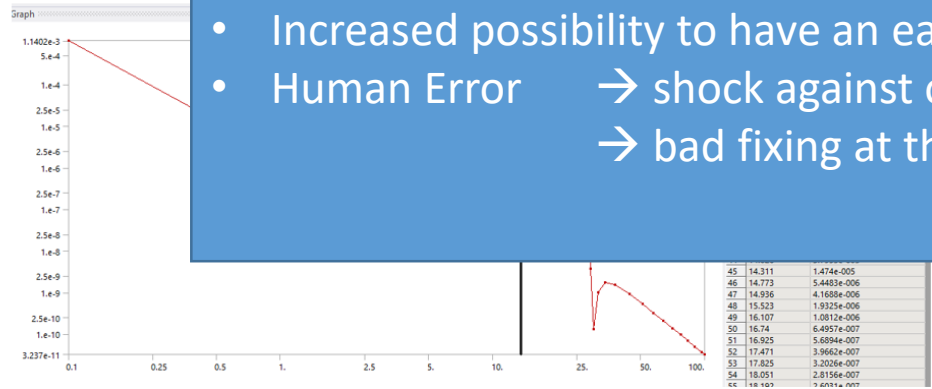


Figure 6-59 Scenario 1 – Vibration in Z direction – Results at the Bottom Panel

A peak is found at 13,555 [Hz] with a PSD of $4.855e^{-4}$ [(mm²)/Hz]
 Indicatively vibrational amplitude derived of the Top Panel → A= 0.081 mm

Device Design:

BS EN 13155:2020
EN 13155
 December 2020
 Supersedes EN 13155:2003+A2:2009

Version
 lifting attachments
 Krane - Sicherheit - Lose Lastaufnahmemittel

Regulations which stipulate the conditions for giving this version. Up-to-date lists and bibliographical references are to be found in the EN 13155:2020+A2:2020 document.
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Semi-Static FEA were done assuming 0.65g in every direction



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