



# International Nuclear Services

# Designing Tie Down Systems For Heavy Packages – Should Revised Criteria/Guidance Apply ?

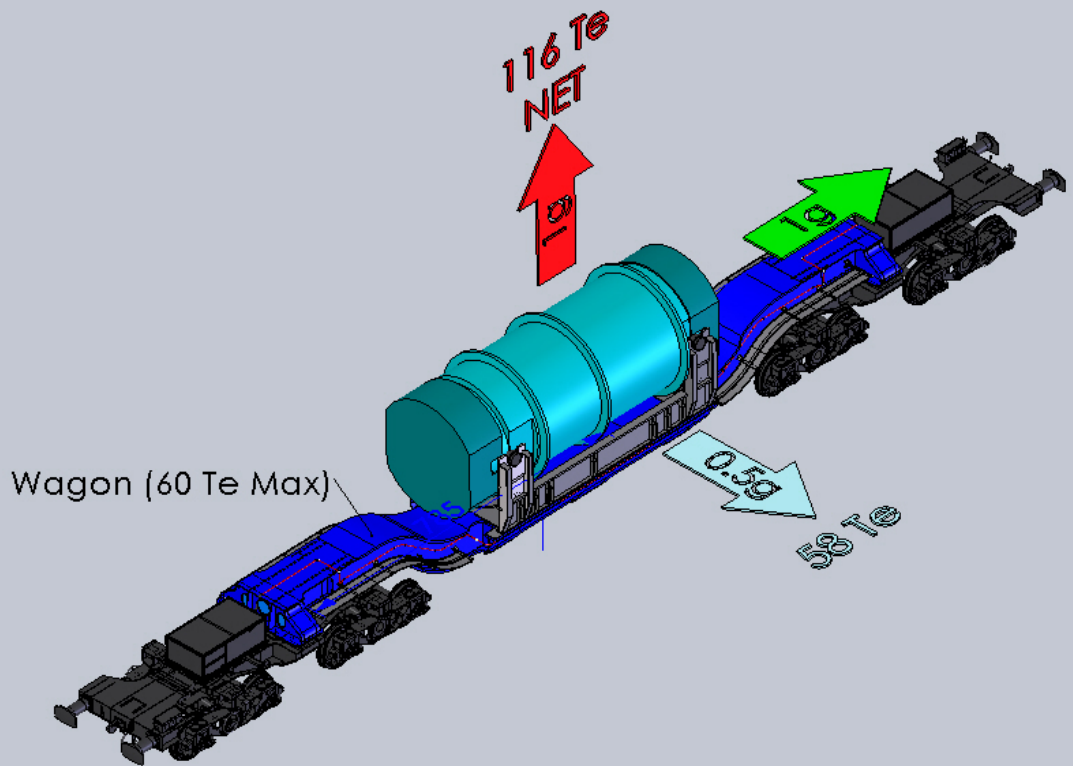
*P Purcell - INS*

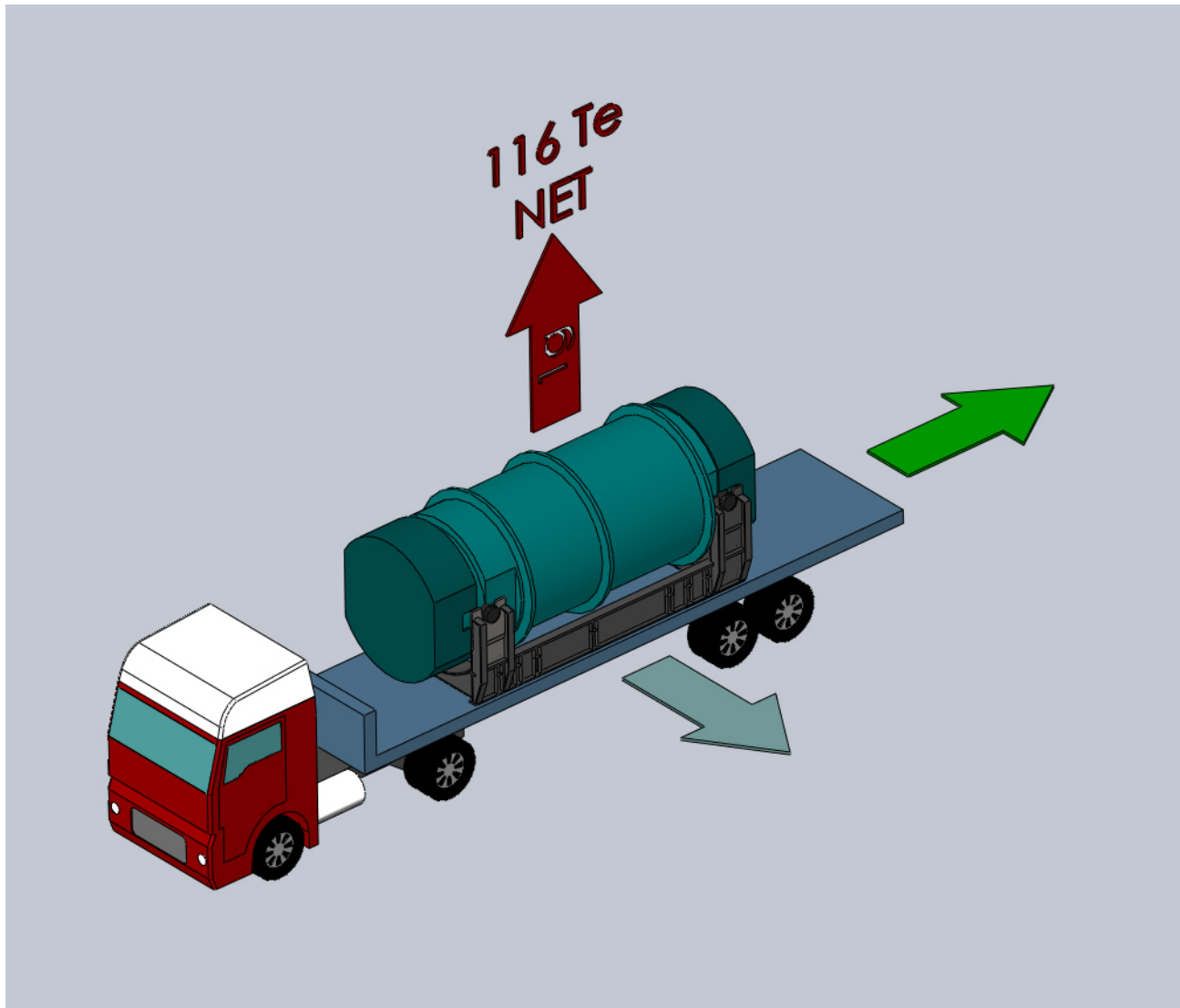


# The Current Advise On Tie Down Parameters

- Although not mandatory, the IAEA Advisory Material gives guidance largely based on tie down standards as applied to the different modes of transport, ie road, rail and sea.
- Although (understandably) acceleration factors differ between these modes, they all assume these factors are applied through the C of G of the load.
- However, it is evident that all modal tie down standards are based on the assumption the conveyance vehicle is heavier than the load!







# Summary

- In certain load directions, ie lateral & vertical, the tie down system is over designed because it is the mass of the conveyance that determines the stresses – not the load!!
- Does this matter in practice ? Answer = Yes it can.
- It means that weight and size of the tie down frame is increased without any safety benefit and can lead to removable components being impractical for manual handling – ie trunnion caps



# Proposal

- No one involved with the transport of heavy RAM packages would advocate a potential reduction in safety – ie lower standards.
- However, for road and rail transport of heavy RAM packages there is a case for taking account of the conveyance weight when designing the tie down system, particularly against upward and lateral forces.
- It is my proposal that IAEA Advisory Material TS-G-1.1 recognises this and it includes guidance to this effect.
- The appropriate safety case would still need to be submitted but give the designer opportunity to demonstrate overall safety was no less, when taking account of the conveyance weight, compared to a tie down design purely based on the RAM package weight.

