

WOOD FILLED IMPACT LIMITER

Numerical simulation of a wood filled impact limiter and simulation of a drop test of a transport and storage cask.

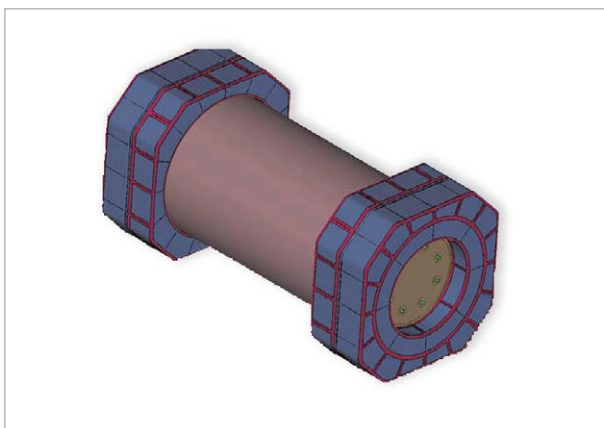
Optimization Task

CASTOR® Casks for the transport and storage of radioactive material are equipped with impact limiter reducing the loads of hypothetical accident conditions. The material wood is used to absorb the kinetic energy. Because of the specific compression behavior of wood, a special material model has to be applied for the numerical simulation. This model has to be capable of describing the non-linear deformation behavior taking into account the direction of fibre as well as the decrease of the volume. The program LS-DYNA provides several material models designed for foams or honeycomb structures that are able to describe compressible behavior. For the application of these models to wood, suitable material parameters have been determined on the basis of simulations of experiments with cylindrical specimens. The determined material parameters have been applied to the simulation of drop tests of transport and storage casks.

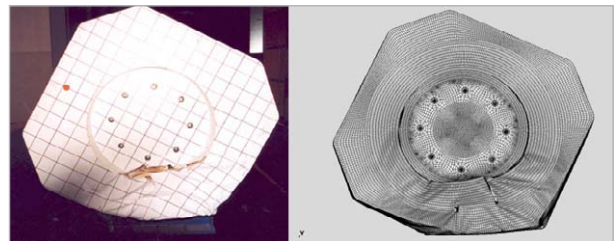
- Verification of LS-DYNA material modelling approaches
- Impact limiter modelling
- Conclusions

Customer Benefits

The behavior of the impact limiters at drop tests could be predicted with reasonable accuracy by the finite element code LS-DYNA. It is of great importance to qualify a suitable material model for the specific energy absorbing material. For the wood types spruce and beech, this has been performed by cylindrical specimens which have been dynamically compressed. With this characterisation, a good calibration between the simulation results and cask drop tests could be achieved.



FE model of the cask and the impact limiters



Deformation of the impact limiter

Solution Methodology

- Deformation behavior of wood under dynamic impact loading
- Plastic material models for the simulation of the compression of wood material