Validation of the Simulation Methodology for a Pipe Whip Restraints Analysis Using Explicit Method in LS-DYNA®

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One of the requirements of a safe nuclear power plant design is the postulation of the full "Guillotine" rupture on a high energy pipe.
The purpose of this study is to analyze the "energy absorption" of the Pipe (anti-) Whip Restraint (PWR), a structural device that that would prevent the dangerous consequences of the dynamic effects and high pressure /high temperature fluid jets.
ANSYS LS-DYNA® Explicit Finite Element code is used in modeling the pipe whipping effects, which includes the piping system and pipe whip restraint.
To assess and evaluate the uncertainty of the PWR loads, the results obtained using different material constitutive models, are compared with a literature well know experimental test case.
Subsequently the "Smooth Particle Hydrodynamics" (SPH) approach, available in LS-DYNA, was coupled with the structural model of the pipe to simulate jet geometry of the break and the real thrust force on the PWR.