

## Energy Absorbing Structures (ENAS)

### Building Protection against Airplane Crash (APC)

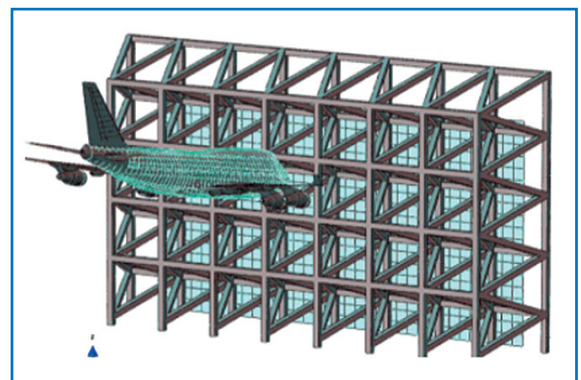
Framatome has technical solution for the increased safety requirements referred to the airplane crash loads acting on existing structures in nuclear power plants

#### Challenge

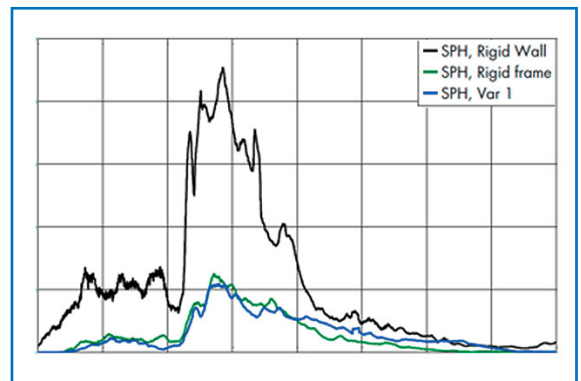
- Increased APC safety requirement for the existing nuclear structures
- Structural redesign for the increased APC loads.

#### Technical information

- Ensuring of sufficient building resistance against airplane impact by installation of Energy Absorbing Structures protecting the outer walls
- Structural design against increased APC load level
- Nonlinear dynamic analysis for APC Impact on building structure considering the shielding protection provided by ENAS steel frame
- 3D finite element aircraft model including all relevant stiffening members of the aircraft body
- Finite element calculation considers impact scenario including the fracture of the aircraft body caused by ENAS and resulting plastic effects and splashing of fuel in the aircraft wings
- The fuel is represented by a smooth particle hydrodynamics approach (SPH) enabling a more realistic simulation of the fluid behavior
- Significant reduction of APC impact energy acting on existing building
- Reduction of APC induced vibrations inside of building structure



ENAS steel frame shielding the existing building structure



Reduction of residual APC energy acting on existing structure protected by ENAS

#### Customer benefits

- APC redesign of the existing building structure depending on postulated authority requirements.
- Possibility to calibrate ENAS dimensioning to keep the residual APC impact energy acting on protected structure within the acceptable load level depending on existing structure resistance and admissible APC induced vibration level inside of the building.
- ENAS installation feasible during normal operation

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**Contact:** [engineering-studies@framatome.com](mailto:engineering-studies@framatome.com)  
[www.framatome.com](http://www.framatome.com)

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