

# Licensing Groupe Turbo-Alternateur sur EPR aux USA

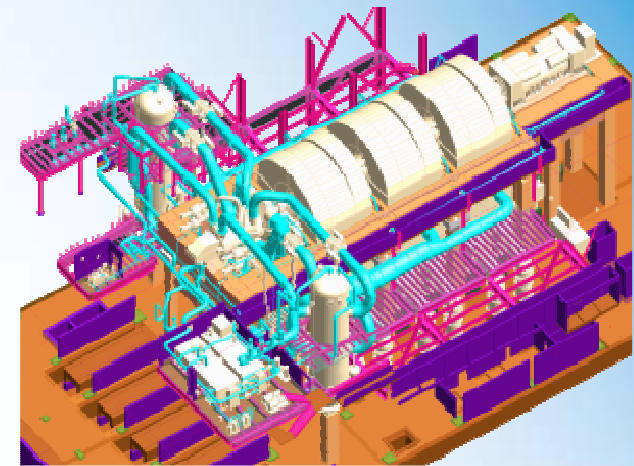
## Objective

Build file specifications bodies auxiliary steam turbine for the Licensing of EPR in the United States by the National Radiation Commission (NRC).

## Approach

- 1 - Development Process Technical GTA EPR,
- 2 - Development of instrumentation and control of ATM
- 3 - Design of mechanical auxiliary turbine (pipes, exchangers, tanks, ...)
- 4 - Specification of mechanical installation and integration of ATM in the virtual model of the central
- 5 - Finalizing the Document: Specification and Licensing

Difficulties encountered: Interpretation of U.S. standards  
 Converting Featured EDF <-> KKS  
 Pressure legal contract



## Results

- Pre-study for the installation of the turbine systems (lubrication, adjustment, sealing steam, starting, protection, floor dryer, steam superheater, security, maintenance, ...)
- Standardization of equipment compared to the EPR Flamanville

## Client benefits

ALSTOM Power: 100% of licensing documents delivered on time  
 Experience gained in previous cases, including nuclear in the U.S. with the client Bechtel

# Design/manufacture of a “over wrapping” for containers of transport of radioactive materials

## Objectives

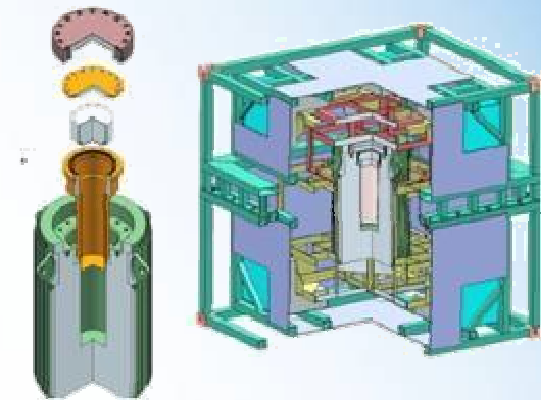
- To make converge specific needs, interests and constraints of each of the two partners
- To contract the partnership, to specify the need and to attend the choice of the engineer
- To control the realization (total budget studies/manufacture 1 M€)

## Our way

- Interface between the two partners to define a perimeter of common need (taken into account of the stakes and objectives of each one)
- Assistance with the development of an agreement of partnership defining the division of the costs, the intellectual and industrial properties; constitution and animation of a Technical Committee of Follow-up and a Steering committee
- Piloting of engineering
- Technical Interface between the engineering and the various users installations
- Difficulty: to reconcile the interests and the financial stringency of SME innovating with a Co-donor of order (official establishment) having a panel of interlocutors

## Client benefits

Independent Altran as third ensures the essential mediation for the design



## Results

- Launching of the business by taking of account the greatest number of needs
- Total follow-up of the project and the interactions with the other industrial expiries of the partners (dismantling of FAR, acceptability of sources to the ANDRA)
- Presentation of the partnership and the solution to the Nuclear Authority of Safety

## Project EPR (European Pressurized water Reactor)

Altran Project: Specification of control systems and command of the nuclear island in the definition phase of the Franco-German EPR nuclear power plant

### Objectives

- Realisation files specifications of the system was controlling my command the regulation and monitoring of the parametres-sister of actor and primary circuit
- Specialties © pecification architectures
- Realisation files for specific instrumentation (measurements of the positions of bars was controlling and measuring the level of water tank)
- Analysis and validation of records of other system
- Establishment of functions to standardize diagrams functional capabilities was controlling command

### Approach

- Operation of nuclear PWR
- Control of nuclear command
- System Engineering



## Dimensioning and budgeting of the equipment of handling of a nuclear thermal power station

**Objectives** To dimension the hoisting and handling equipment of a nuclear thermal power station.  
 → in particular, the polar bridge, accounts for 1/4 of the cost of the equipment of the central enclosure

### Our way

Analysis of the nuclear safety of the equipment of handling  
 → **Originality** : dimensioning with the seism by the spectral analysis

Preliminary studies of dimensioning  
 Schedule of conditions for consultation of suppliers including the applicable regulations (KTA / FEM / ASME)  
 Classification of the answers of three industrialists

**Difficulty** : the answers of the industrialists let predict a deficiency with the seism of the polar bridge.  
 → This point is thus subjected to complementary investigations.



### Results

Evaluation of the three suppliers which have answered.

### Clients benefits

Application of standards badly known by the company  
 Modeling according to the spectral, relevant method on this case.

# Steam Line Vibration Resolution

## Objectives

A nuclear utility was experiencing a long-standing steam line vibration problem resulting in repeated support failures. Several attempts by various vendors to improve conditions had no effect.

## Our way

Altran's initial effort examined pipe support components to determine that failure was due to high cycle fatigue. Altran provided acoustic analyses of the piping system and correlated it with data recorded during earlier testing to identify and define the source of a hydraulic pressure variation. We also performed a structural analysis to determine the probable locations where resonant amplification could occur. This analytical process was used to make strategic substitutions in the existing support configuration until the system frequencies in critical locations were sufficiently altered to abate the resonant amplification. Final pipe support design and engineering was completed and field testing confirmed that vibrations were greatly improved.

## Results

Project was successfully completed and our client could overcome the line vibration problem

Pressure Waves of Two Pressure Transducers in Frequency Domain

