

Senior Design Project Description

Company Name	Areva	Date Submitted	June 15, 2017
Project Title	Alternative Impact Limiter Designs for Used Nuclear Fuel Shipping Casks (AREVA_IMP)	Planned Starting Semester	Fall 2017

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	4	Electrical	
Computer		Systems	
Other ()			

Project Overview:

Nuclear plants were originally designed to provide temporary storage of spent fuel on the reactor site. The rods removed from service are initially put into cooling pool where the temperature and radioactivity is lowered. The spent fuel was intended to be transported off-site where it could be reprocessed into usable fuel or disposed of as waste. However, reprocessing did not occur as planned and storage at site went from temporary to long term. As the pool capacity was exceeded, a dry storage system was developed. The containers for dry storage are called “Casks”. To safely transport casks, impact limiters have been designed to mitigate the effects of accident scenarios that could breach the casks.

Initial Project Requirements:

Currently some used nuclear fuel shipping casks are designed to utilize impact limiters that either cannot be built due to a shortage or lack of building materials or are too cost prohibitive to build because of the use of difficult to obtain supplies or difficult to perform manufacturing processes.

This project would involve designing impact limiters for a shipping cask system that are capable of withstanding hypothetical accident conditions (HAC) as specified in 10CFR71. These HACs involve drops, impacts, fires, etc. and would require the students to perform some modeling using software programs capable of modeling mechanical properties to demonstrate their designed impact limiters would be able to protect the used nuclear fuel from these HACs (e.g., ANSYS). In addition, there is a cost element to these impact limiters that should also be considered to ensure an



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effective and affordable solution has been obtained. The Project Team would be provided the

design of a cask system and the design of the current set of impact limiters the cask system has been licensed to as a starting point. The team would then be asked to establish materials for and develop the design for impact limiters for the ~125 ton, ~8 foot diameter, ~25 foot in length cask system and the impact limiters would have to have a diameter less than ~11 feet to ensure the cask can be shipped by rail.

Expected Deliverables/Results:

- Design for impact limiters that meet the specifications
- All back-up analysis that demonstrates compliance with the specification

Disposition of Deliverables at the End of the Project:

No hardware to be produced

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

- Skills and access to software products to perform the static and dynamic modeling.