Professional CV

JOSÉ FRANCISCO DEL VALLE MOJICA

Key qualifications:
PhD, Materials Science, The University of Manchester, 2019
MSc, Mechanical Engineering, Instituto Tecnológico de Veracruz, 2013
BSc Mechanical Engineering, Instituto Tecnológico de Veracruz, 2007

Key experience:
Experience in Abaqus CAE (Finite Element Analysis), COMSOL Multiphysics
Proficiency in the Finite Element Method (FEM) for modelling and analysis of mechanical structures in combination with Computer Aid Design (CAD) and imaging techniques such as CT–Scanning and 3D-Scanning, also including 3D printing technologies.

Graduate Engineer October 2019 – Present
Engineering Analysis Services Limited (EASL), Altrincham

As part of EASL I have originated calculations of minimal allowable thickness (MATs) of pipes corresponding to DNB boiler units using design codes and participated as verifier of calculations assessing pressure vessels following PD5500 procedures. Additionally, I have liaise with clients in a number of projects either to discuss technical details of the work at hand or just as a point of contact between the client and EASL for specific projects.

Finite Element Analysis
My main contributions within EASL include the development of Finite Element (FE) models for the derivation of stresses to support different structural assessments, and supporting the report writing of the corresponding deliverables. The developed FEA have considered elastic and/or plastic materials properties, static loading, seismic loading and thermal transient loading.

Dungeness B Superheater and Reheater analyses:
Modification of existing superheater and re-heater ABAQUS FE models constructed with beam elements (ELBOW32) for the assessment of bending moments implementing static and seismic analyses.

Creation of a stand-alone model solid elements model of the superheater bifurcation subjected to bending moments taken from the ELBOW 32 superheater model to investigate if the bifurcation stresses were bounded by stresses somewhere else in the superheater.

Dungeness B: Plastic collapse of Main Steam Warming Line (MSWL)
Creation of a FE model in ABAQUS CAE of the MSWL branch to derived stresses from the application of unit pressure, force and moment loading to support a Limiting Defect Size (LDS) assessment. The work involved carrying out a Riks analysis to determine plastic collapse of the MSWL at the base of the branch weld.

CGN: Generic Design Assessment for UK HPR1000
Creation of full, half and quarter FE models in ABAQUS CAE of the CGN RPV inlet nozzle to carried out stress analyses to support a Defect Tolerance Assessment (DTA) for the crotch corner of the inlet nozzle of the Reactor Pressure Vessel (RPV). The work involved the derivation of through wall stresses resulting from the application of Primary Loading (pressure, moments, forces) and Secondary Loading (thermal transients). In addition a Riks analysis was carried out to determine plastic collapse at the crotch corner.

Sizewell B: Stress Analysis for RPV Closure Head and Vessel Flange Region
Creation of 1/54th FE model in ABAQUS CAE of SZB RPV Upper Head to carried out stress analyses to support subsequent DTAs. The model was used to derive stresses at Location 17 due to the application of Primary Loading (pressure) and Secondary Loading (thermal transients). The FE model considered the closure head, bolt-nut, and vessel flange with model extension. A contact interaction between the vessel and head flanges was modelled. A bolt preload was considered in both the primary and secondary loading analyses. During the secondary loading analyses the bolt load varied due to changes in temperature; therefore, appropriate post-processing was conducted to separate primary and secondary stresses.

Heysham 2: Assessment of LP2 Heater Supporting Outage Referral
Modification of an existing ABAQUS half-model of the HY2 LP heater in order to construct the full LP heater model. The full LP heater model was used to assess the possibility of collapse of the vessel shell following the removal of a square shell section by comparing relative displacement of the section of the shell being cut prior and post cut.

Heysham-Torness: Determination of Virgin Graphite Critical Stresses by Means of FEA
Creation of a FE element model in COMSOL Multiphysics to simulate a destructive test in which purposed-machined virgin graphite test samples of the groove and sealing ring had been used. The experiment replicated the junction between the graphite bricks of nuclear reactors. In the experiment the sealing ring was pushed against the wall of the graphite groove until fracture of the groove and the load to fracture recorded. The experimentally obtained load to fracture (critical load) has been used as input in the FE model in order to derive the stresses to fracture (critical stresses).

Previous Experience:

Materials Science
- Total hip arthroplasty; hip joint modelling, implant failure, femoral head size, and acetabular component of hip replacement implants.
- Undertaken research using Finite Element Modelling and experimental techniques for validation (Digital Image Correlation)

Mechanical Engineering
- Residual stress analysis, seamless steel pipes, welded joints.
- Research experience in the industry and academia applying experimental and computational methods for solving science and engineering problems.
- Hands-on experience in the industrial development of seamless steel pipe for the oil industry, heat treatments, residual stress measurement and analysis in welded joints, characterisation of materials including mechanical properties and microstructure.