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Finite Element Analysis of the Blanking and Stamping Processes of Nuclear Fuel Spacer Grids

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Abstract : Spacer grid assembly supporting the nuclear fuel rods is an important concern in the design of structural components of a Pressurized Water Reactor (PWR). The spacer grid is composed by springs and dimples which are formed from a strip sheet by means of blanking and stamping processes. In this paper, the blanking process and tooling parameters are evaluated by means of a 2D plane-strain finite element model in order to evaluate the punch load and quality of the sheared edges of Inconel 718 strips used for nuclear spacer grids. A 3D finite element model is also proposed to predict the tooling loads resulting from the stamping process of a preformed Inconel 718 strip and to analyse the residual stress effects upon the spring and dimple design geometries of a nuclear spacer grid.

Keywords : blanking process, damage model, finite element modelling, inconel 718, spacer grids, stamping process
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