

ABSTRAK

Bejana tekan vertikal merupakan peralatan industri yang harus dirancang sesuai standar keselamatan untuk mencegah kegagalan struktur. Penelitian ini bertujuan untuk menganalisis perhitungan desain bejana tekan vertikal serta mengevaluasi pengaruh variasi jenis *head*, ketebalan *shell*, dan material terhadap perilaku tegangan dan deformasi. Metode penelitian dilakukan melalui perhitungan teoritis berdasarkan *ASME Boiler and Pressure Vessel Code Section VIII Division I* dan analisis numerik menggunakan metode *Finite Element Analysis (FEA)* dengan perangkat lunak *ANSYS*. Hasil penelitian menunjukkan bahwa variasi ketebalan dinding (*shell*) dan jenis material berpengaruh signifikan terhadap nilai tegangan, deformasi, dan faktor keamanan bejana tekan. Selain itu, jenis kepala (*head*) memengaruhi distribusi tegangan yang terjadi pada bejana tekan vertikal. Berdasarkan hasil analisis tersebut, desain bejana tekan vertikal yang dirancang dinyatakan aman dan memenuhi kriteria keselamatan sesuai standar *ASME BPVC*.

Kata kunci : Bejana tekan, *Finite Element Analysis*, *ASME BPVC*, *ANSYS*.

ABSTRACT

Vertical pressure vessels are critical industrial equipment that must be designed in accordance with established safety standards to prevent structural failure. This study aims to analyze the design calculations of a vertical pressure vessel and to evaluate the effects of variations in head type, shell thickness, and material on stress, deformation, and safety factor behavior. The research method combines theoretical calculations based on the ASME Boiler and Pressure Vessel Code (BPVC) Section VIII Division I with numerical analysis using the Finite Element Analysis (FEA) method implemented in ANSYS software. The results indicate that increasing shell thickness and selecting materials with higher mechanical strength reduce stress and deformation while improving the safety factor of the pressure vessel. Furthermore, the head type significantly affects stress distribution in the vertical pressure vessel. Based on these findings, the designed vertical pressure vessel is considered safe and meets the safety requirements specified by the ASME BPVC standard.

Keywords : *Pressure vessel, Finite Element Analysis, ASME BPVC, ANSYS.*