Solidworks finite element analyis reports example

Experience, Failure

(e) Estimate the average pressure loading on the pressure vessel and use the standard equations for thin-walled pressure vessels to make an estimate by hand calculation of the pressure vessel wall thickness required to give a Factor of Safety of not less than 2 using whichever of the two failure criteria gives the safer result.

Conclusion

- The weight is calculated with accuracy of -0. 22(%) for the empty vessel.

- The weight is calculated with accuracy of -0. 05(%) for the filled vessel.

- The calculated stress is verified by its comparison with hand calculated membrane stress.

- Von Mises and Tresca criteria are applied to upper and lower spherical part of the pressure vessel, with FOS larger than 2.

- Von Mises and Tresca criteria are applied to the cylindrical part of the pressure vessel, using an average Mises stress, with FOS smaller than 2.

- Von Mises and Tresca criteria are applied to lower spherical part of the pressure vessel, with FOS larger than 2.

- After the verification of stress level at the cylindrical part of the pressure vessel, with Von Mises criterion, the required thickness is calculated as 0. 042(m).

- If this pressure vessel were made with a spherical shape, FOS might have been larger than 2 as a whole.

- The wall of a pressurized spherical vessel is subjected to uniform tensile stresses in all directions.

- When a cylindrical pressure vessel is to designed, care must be taken

especially failure strength of a cylindrical part.

- The longitudinal welding might better be replaced by a helical welding.

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