

Load case - run in hole

Oliasoft

Abstract

In this document we describe the load case *Run in hole* available in the Oliasoft™ application.

Introduction

Run in hole is an installation load case, on the same line as *Overpull*, and the unknowns are the axial load with and without bending from dogleg when running the tubing¹ in the hole. Contrary to the usual axial loads calculations, which give the axial load on a tubing at a given pressure and temperature, this load case calculates the maximum load a given point on the tubing experience while running the tubing in the hole, with and without bending. Effects included are the weight of the tubing, buoyancy forces from piston effects, bending forces from dogleg, and finally, a shock load describing a possible sudden stop.

Inputs The following inputs define the run in hole [installation] load case

- 1) A complete description of the wellbore, including measured depths, true vertical depths, and dogleg severities.
- 2) A complete description of the tubing dimensions, including density and weight, inner- and outer-diameters, internal- and external- crossovers.
- 3) The mud weight/density, ρ_{mud} .
- 4) A running speed, v_r , used in the shock load calculation.

Calculations The run in hole axial load on the tubing is calculated as follows

- 1) Calculate the hydrostatic pressure in the wellbore from mud.
- 2) Calculate the bending force due to dogleg severity.
- 3) Calculate the shock load

$$F_{\text{shock}} = \frac{3}{2} v_r A_x \sqrt{E \rho_{\text{steel}}}, \quad (1)$$

where A_x is the cross section of the tubing, E is Young's modulus of steel, and ρ_{steel} is the density of steel.

- 4) Calculate the axial load sequentially as the tubing is run in the hole, from weight and piston forces, and add the shock load. For axial load with bending, add the bending force from dogleg severity as well. Then, at every measured depth, referenced to the tubing, report the maximum load experienced.

¹We denote any tubular by tubing. All calculations encompass both tubings and casings.