

Preliminary study on cutting solid object using water at pressure exceeding 1000 MPa

Abstract

To date, the highest pump pressure available in market is 648 MPa from FLOW International Corp. Cutting with ultra high pressure reduces abrasive usage, faster cutting speed, increased depth of cuts and increase efficiency. This research explores the possibility of applying pressure exceeding 1000 MPa to push pure water to cut solid objects. 10 grams of PE4 explosives are exploded in a confined chamber with a rectangular opening. Simulations in designing the blast test jig are discussed. Simulations are done using Autodyn software. The simulation aims to get the optimum geometry that can give the highest pressure at nozzle exit. Two materials are chosen to cut; stainless steel 304 and aluminum 1100. Simulations show the optimum blast test jig can cut aluminum and stainless steel at certain thickness.