

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Technology (1) (3)

Author: Ms. Akane Nagasaki
Mitsubishi Heavy Industries, Ltd., Japan, akane_nagasaki@mhi.co.jp

Mr. Daiki Watanabe
Mitsubishi Heavy Industries Ltd. Japan, Japan, daiki1_watanabe@mhi.co.jp

ADDITIVE MANUFACTURING DEVELOPMENT FOR ROCKET ENGINE IN JAPAN

Abstract

MHI has been making IRD efforts to develop AM (Additive Manufacturing) capabilities for rocket engine parts. Based on the successful results by MHI and by JAXA itself, JAXA is researching for applying AM parts to LE-9, the next booster engine under development. Currently applications are limited to simple shaped parts in which traditional NDI (Penetrant inspection and X-ray inspection) can detect possible defects. JAXA and MHI are now working hard to manufacture some ducts with AM technology and use them in the actual engine test in the near future. For future application, MHI is researching to use AM technology to more complicated parts such as an injector with hundreds of injection elements. Usually wall thickness and passage gap of an injector are much less than 1mm, which makes it very challenging to build an injector by AM. After intensive trials and parameter optimization, MHI manufactured the sub-scale AM injector with 8 injector elements with helpful advices by JAXA on the configuration. JAXA tested it at Kakuda SC, which was very successful. The traditionally fabricated injector with the same dimensions as AM injector was also tested. Performance and flow characteristics of these 2 injectors were compared and turned out to be almost equal.